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It's not too late to INCREASE the COMPRESSION ratio of your 1933 models

Valuable improvements in performance characteristics that will give your car competitive excellence are ready at hand. They involve no expensive last-minute retooling or redesigning.

THE permissible limits of compression ratio are now approached by at least one manufacturer in *every* price class—yielding a reward in performance gains that can be had in no other way. Factors which have worked to raise these permissible limits leave a wide margin for improvement open to most 1932 engines.

Higher compression will make your 1933 car better on each of these counts:

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(2) **Faster acceleration.**

(3) **Better hill climbing ability.**

(4) **Less heat to cooling water.** The increased efficiency of higher compression offers relief to cooling systems instead of overloading them.

(5) **Lower exhaust gas temperatures.**

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Curves showing the percentage increases in the yearly averages since 1925 for all American passenger cars for engine sizes, horsepower, brake mean effective pressure, r.p.m. at maximum horsepower and horsepower per cubic inch are presented on the opposite page.

AUTOMOTIVE INDUSTRIES

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Fresh Capital Eludes Capture For Automobile Retail Business

Continued deficits raise barriers against flow of fresh capital from usual sources, as dealers fail to make profits under existing conditions

by Norman G. Shidle

"THE automobile retail business must be recapitalized out of profits."

That statement is a challenge and a warning to every automotive manufacturer.

There isn't any profit in the retailing of new automobiles any more. Factories may still argue that there *might* be if the dealer would operate in such and such a way. And maybe they are right. But the bald fact remains that — with the exceptions which won't amount to 10 per cent of the total— profit isn't being made from new car sales at retail any more no matter whether general business is in a boom or in a depression. The situation is worse during a depression, but the business doesn't yield reasonable profit on the average even in good times.

Such profit as can be made comes chiefly from side lines—service sales, parts and accessory sales, inflation of delivered prices, chiseling on financing charges, and other means of turning a profitable dollar which hard pressed retailers have resorted to as they saw dwindling new car profits gradually being engulfed deeper and deeper in a flood of used car losses.

Up until a few years ago, there was always somebody with new capital who could be enticed to fill the vacancy left by the latest failures. But new money has been hard to lure into the field for several years

The only way for car manufacturers to keep out of the retail business is to set up conditions which make it profitable for somebody else to be in it

now. Today it is extremely difficult to get new money invested in new car franchises. Tomorrow, unless profit conditions change, it is quite likely that the task may be impossible. For too many years the retail automobile business has eaten away retail capital investments while factories held meetings, devised systems, harangued dealers and proved to their own satisfaction that the whole trouble lay in the inefficiency and dunder-headedness of the dealers.

So long as new money and new people could be obtained to fill the gaps caused by failures, the factories could be satisfied with rationalization about where the trouble lay. They could tell themselves over and over again that the dealer had brought upon himself the financial ruin which overcame him; they might have been moved to shed a hasty tear over his ill fortune, but always succeeded in getting a new retailer to fill his place and maintaining the same basic policies which have prevailed since the industry began, altering only a few minor elements designed to alleviate the most virulent and most acute of the ills which brought about the demise.

But up until recently there has lain at the base of most factory policies, despite modifications and changes of various elements, the one fundamental axiom:

"If a dealer fails, it's his own fault."

And factories have proved their own case to themselves over and over again by citing examples which are the exception rather than the rule, and by pointing to, as horrible examples, all those things which the retailer had done incorrectly.

But they haven't proved their case to the retailers; nor have they convinced the people who supply money to retailers; nor have they impressed the people who might put money into becoming retailers. That is clear from the difficulty with which any new capital is enticed into automobile retailing today.

And tomorrow, unless the retail business gets on a profit basis, there won't be anybody for the factories to argue with. Potential and actual retail capital is tired of arguing. Prospective capital is simply leaving the business or refusing to come into it. A few more years of this and the factories will find themselves talking to themselves—literally, perhaps, as well as figuratively. Everybody else's money will be gone out of the retailing of new automobiles either through attrition, opportunistic liquidation or angry withdrawal.

The time has already arrived when a vast array of actual profit figures on the books of *average* dealers is needed to rehabilitate faith and eagerness to participate in the retailing of automobiles. Dealers are tired of waiting until "next year."

Factory executives aren't blind to the seriousness of the situation. They know its difficulties and its troubles.

But not all of them have faced the cold, hard fact stated in the first sentence of this article:

"The automobile retail business must be recapitalized out of profits."

That statement was made to us by one of the two or three most important and successful merchandising executives in the automobile business; a man whose record for clarity of vision and hard-headed practicality is second to none. He is facing the facts. He sees a tremendous job ahead. He firmly believes it can be done. But he sees the task as one of rejuvenation from *within.*

Executives with one accord cry that the car manufacturer never wants to get into the retail business. Alfred P. Sloan himself one time said to us—and told us to quote him any time—that all of the various activities which General Motors has set up to study and work with retailers were designed for the sole purpose of keeping out of the retail business—not with any idea of ever getting into it.

Yet, eventually, the only way for any car manufacturer to keep out of the retail business is to set up conditions which make it profitable for somebody else to be in it—even at the sacrifice of some immediate profit to stockholders.

We pointed out a few weeks ago that there probably was less financial participation by manufacturers in retail operations as a result of this depression than was generally believed. Such participation as has taken place has been reluctant and will be withdrawn as soon as possible.

The question that is troubling the minds of some factory men, though, is how soon "as soon as possible" will be. Even good times, some of them think, will not solve this problem unless the retailing operation actually can be shown to be profitable in a majority of years.

And there are some dealers who point out that, if factories could be forced to sell to dealers on a 30, 60 or 90-day basis, as is common in many other industries, the problem of overproduction, forcing of cars and, indirectly, used car trading competition might be much nearer solution than ever before.

Certain it is that manufacturers in the future will have to give more than lip service to the creed that "Our prosperity depends on the prosperity of our dealers." So far it hasn't. Factories at times have made plenty of money while dealers were losing it. Such a condition was possible only because dealer capital was constantly being devoured.

That situation can't continue indefinitely. Many think that even now the end of the road is in plain view. The manufacturer whose dealers don't make money soon, they point out, just won't have any dealers.

Perhaps we will wake up some morning to find that a platitude has become a vital, living truth!

"Our prosperity depends on the prosperity of our dealers."

"The automobile retail business must be recapitalized from profits."

JUST AMONG OURSELVES

Executives Disappointed, But Air is Cleared

THE election returns have just come in. Franklin D. Roosevelt has been elected president.

Automotively speaking, the result will have been a disappointment to Messrs. Ford, Firestone, Sloan, and Chrysler, as well as to a number of other executives who didn't—as these men did—make public statements as regards their political convictions in this particular campaign. A majority of the executives of the industry unquestionably were for Mr. Hoover.

Defeat of Hiram Bingham (R.) in Connecticut Senatorial race, which is indicated as we write, will be regretted by many in the automobile and aviation industries. It is ironic that this forceful apostle of American aviation progress should have been defeated in one of the few states carried by Mr. Hoover.

Roy D. Chapin will end his term as Secretary of Commerce —where he has already made an outstanding record of successful administration in a very brief period—on March 4, next.

At any rate the election is over. The air is cleared. The way is open again for greater concentration on business problems and business activity.

Those who believed Mr. Roosevelt's election desirable will go forward with new vigor. Those who opposed it will almost certainly join in the spirit of that fine, purposeful, brief message sent by Mr. Hoover to Mr. Roosevelt immediately following the election, in which our President wrote to his successor:

"I congratulate you on the opportunity that has come to you to be of service to the country and I wish for you a most successful administration. In the common purpose of all of us I shall dedicate myself to every possible helpful effort."

Car Makers Don't Like Retail Idea

WE have always felt that the constant protests made by car manufacturers that they never want to get into the retail business were quite sincere. The arguments against such a move are so many and so forceful that it's difficult to think of any manufacturer messing with retailing if he can avoid it. Chevrolet had some retail experience a while back, if our memory doesn't fail us, and it is certainly hard to find anybody in General Motors today who has even a faint liking for the idea of retail operation by a factory.

Reduction in number of dealers in big cities has been taking place in several of the low-priced car organizations, including Ford. Partly this reduction has been planned in order to give better opportunity to existing dealers to make money; partly it has been involuntary. Dealers crowded too close for profit have been folding up at an appalling rate in the last few years.

The permanency and final scope of the Ford retailing experiment, it seems to us, will rest almost certainly on the degree to which it turns out to be profitable to the Ford Motor Co. And it's too early to determine that. By and large, factories have not been successful in their forays into retailing although some notable examples of individual successes are to be found in the records of automotive history.

Chain Stores a Long Way Off

NEVERTHELESS, we can't get much excited over the idea that this particular Ford move has anything to do with chain store operation of passenger car retailing in general or even in the case of Ford. We *do* believe that car manufacturers pretty soon are going to be faced with a choice between making it possible for retailers actually to make money and going into the retail business themselves. (Our views on this matter are extensively aired in the leading article in this issue.) But we think that in the final analysis they will avoid doing their own retailing, if they can.

Desire to improve service facilities, particularly in relation to the new problems brought about by the introduction of new models may have something to do with the Ford move, although sales considerations would seem to be paramount.

The development will be watched with care and interest by everyone in the industry and trade.—N.G.S.

70 hp. Plymouth Six Completely R

by
Athel F.
Denham

Chrysler's newest product, priced from $495, powered with a 190 cu. in. engine, and styled in the modern manner, being compared by Mr. Chrysler (right) and Fred Zeder with the first Chrysler Six

Specifications of the Plymouth Six

Body Model	No. Doors	Price	Wheel-base	Gear Ratio	Wt.
2-p. Bus. Coupe	2	$495	107	4.375	....
2-4-p. Coupe	2	545	107	4.375	....
2-4-p. Conv. Coupe	2	595	107	4.375	....
5-p. Sedan	4	575	107	4.375	2,700

Model Designation	PC
Tire size	17/5.25
Engine make and model	Own PC
No. cyls., bore & stroke	6—3⅛ by 4⅛
Taxable horsepower	23.4
Piston displacement	189.9
Weight, per cu. in. displ.	14.2
Hp., per cu. in.	0.368
Max. hp. at spec. speed	70@3600
Compress. ratio	5.5
Valve arrangement	L-head
Camshaft drive	Morse chain
Piston material	Al. alloy
Cranksh. counterbalanced?	Yes
Vibration damper?	Yes
No. main bearings	4
Oil pressure to	Main beargs. Camshaft beargs. Crankpins Timing drive
Oil cleaner make	Purolator
Crankcase ventilator?	Yes
Air cleaner?	Yes
Engine temper. control	None
Carburetor make	Carter
Fuel feed	AC pump
Ignition make	Delco-Remy
Gener. & starter make	Delco-Remy
Battery make	Willard
Capacity, amp. hrs.	84
Engine mounting	Floating
Clutch, type and make	Single-plate Borg & Beck
Gearset make	Own
No. of speeds	3
Free wheeling?	Yes
Automatic clutch?	Yes
Synchronizers?	No
Universals, type and make	Metal, Univ. Products
Rear axle, type and make	1/2 floating, own
Torque medium	Springs
Brakes, hand	Transmission
Brakes, foot	Hydraulic
Drum type	Centrifuse
Type	Rubber and metal
Springs, front, length & width	35 by ½ in.
Rear, length and width	53½ by 1½
Chassis lubrication	Zerk

Tune-Up Data, Capacities, Etc.

Rings, compression, number	2
Width	⅛
Oil scraper	1
Width	⅛
Oil control	1
Width	5/32
Piston pin diameter	55/64 in.
Piston pin locked in	Floating
Valves, head diam.	1 15/32
Seat angle	45 deg.
Valve lift	5/16 in.
Stem diameter	0.341
Breaker point gap	0.020
Spark plug gap	0.028
Rods removed from	Above
Crankpin diameter	1 15/16 in.
Length	1 in.
Crankcase oil capacity	6 qt.
Radiator capacity	13 qt.
Brake drums, diam.	10 in.
Lining, width and thickness	1½ by 3/16 in.
Clutch diameter	9 in.
Crankshaft diameter	2¼ in.
Bearing lengths, front	1 16/64
No. 2	1 1/32
No. 3	1 1/32
Rear	1⅞
Crankshaft weight	5½ lb.
Camshaft bearings	4
No. 1	2 by 1 3/32
No. 2	1 31/32 by ¾ in.
No. 3	1 15/16 by ¾ in.
Rear	1¼ by 1¼
Conn. rod length	8 1/16 in.
Piston length	3 11/16 in.
Piston pin length	2⅝ in.
Transmission ratio, low	2.81
Second	1.55
Reverse	3.61
Tread, front and rear	56¼ in.
Spark plugs, type	14 mm.
Steering ratio	14 to 1
Axle clearance, front	9 1/16 in.
Rear	8½ in.
Gas tank capacity	11½ gal.
Wheel diam. for airwheels	16 in.

Redesigned for 1933 Low Price "War"

HAVING apparently solidified Plymouth's third-place position in the industry since the announcement in April of the last four-cylinder series, does not seem to have satisfied Walter P. Chrysler. At a cost of several million dollars, the plant of the Plymouth Motors Corp. has been retooled and modernized to enable production of a completely new car, the Plymouth Six.

Styled in the modern manner—with deep sloping radiator front, wide and deep fenders front and rear to conceal the chassis, with a gas tank similarly concealed, sloping hood louvers to carry out the windshield and radiator lines—the new Plymouth represents as nicely balanced body design as has been offered at any time in the low-priced field. Attention to detail, both outside and in, has been an important consideration.

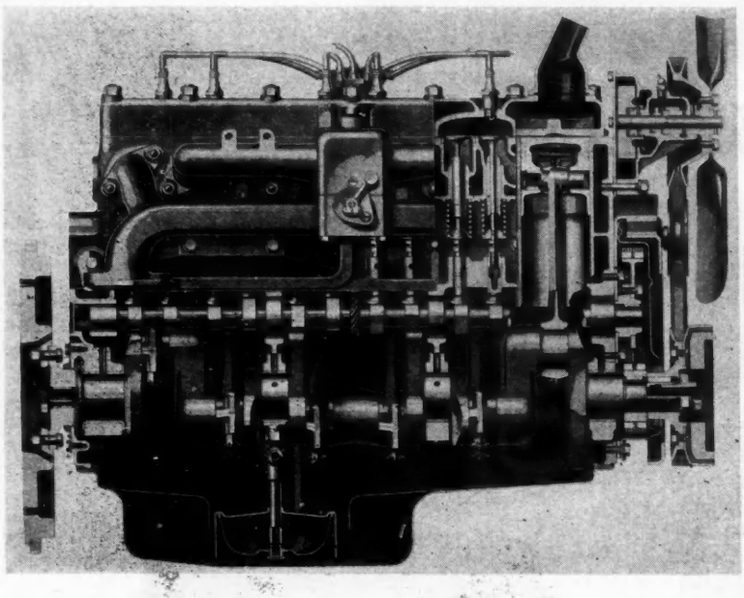
On a 107-in. wheelbase (some 5 in. shorter than the previous series) there has been worked out a body surprisingly ample in fore and aft dimensions. Part of this is due undoubtedly to the clever way in which the front-end design has been worked out to permit locating the radiator ahead of the front axle instead of immediately over it, as is the usual practice.

The overall height has been considerably decreased, partly by the adoption of smaller (17-in.) wheels. The driver's position has been made more comfortable by increasing the tilt of the steering wheel and incidentally making a complete change in the steering arrangement.

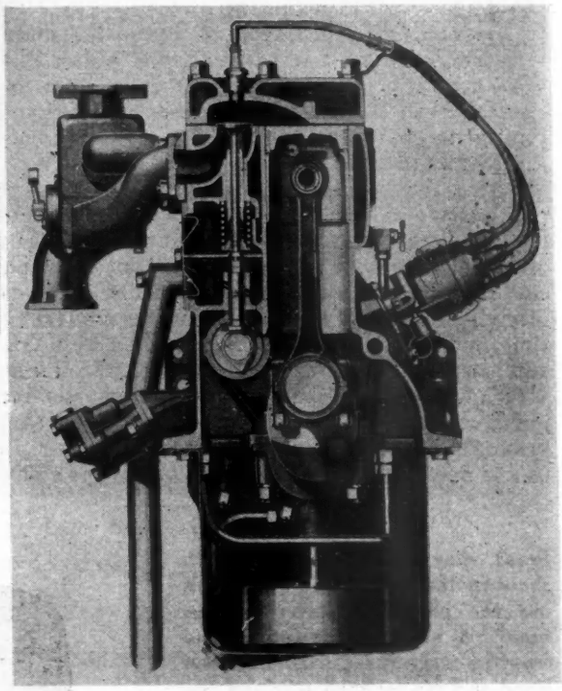
Following the practice adopted in the last Plymouth

Front view of the new Plymouth showing the new fenders concealing the chassis. Note how the hood sill has been raised at the front to make the pocket between hood and fender shallower and the absence of cross-bracing for the headlamps

Rear body detail on the sedan, showing how the chassis is concealed



Longitudinal section through the new Plymouth Six Engine. Note the connecting rod liners and inserted valve seats



Transverse section through the new Plymouth Six engine

series, there is no cowl, as such, visible from the side. The hood overlaps the cowl structure in the same manner as formerly, except at the top, where it sweeps away from the base of the windshield, toward the center, allowing space in the top of the cowl for a long, narrow ventilator. Bodies follow the same general all-steel design practice as formerly.

Inside the sedan models are found exceptionally easily adjustable cross seats, careful draft insulation, an attractive new instrument panel with larger-faced instruments, and the headlight main switch on the dash. The control switch for upper and lower beams is of the foot-operated type.

Upholstery has narrow pleats. In the sedan there are a robe cord, assist cords, etc. The rear window in the rumble-seat coupe can be lowered for ventilation. Shatterproof glass is used for the windshields, and is available at slight extra cost all around.

All doors may be locked from inside. Sheet metal is rustproofed before lacquering. Front fenders are braced to the front cross-member, rather than to the frame side-rail, for better stability of the fenders and of the headlights, which latter are carried on the fenders without cross-bracing used in the last models.

Four body models are going into production to begin with, at least. These are all priced well below the last series, as follows:

Body Model	New Price	Former Price
Business Coupe	$495	$565
Rumble Seat Coupe	545	610
4-Door Sedan	575	635
Convertible Coupe	595	645

1933 Plymouth and 1932 Low Priced Cars Compared

(Compiled and calculated from specifications supplied from factories.—Editor)

Body Model	Plymouth 6 (1933)	Plymouth 4 (1932)	Chevrolet 6 (1932)	Ford 8 (1932)	Ford 4 (1932)	Essex Terraplane 6 (1932)
Business coupe	$495	$565	$490	$490	$440	$470
Rumble seat coupe	545	610	535	535	485	510
4-door sedan	575	635	590	590	540	590
Conv. coupe	595	645	595	610	560	610
Piston displacement	189.9	196.1	194.0	220.0	200.5	193.1
Taxable hp.	23.4	21.0	26.3	30.0	24.0	20.7
Max. brake hp. at specified r.p.m.	70 (@ 3600)	65 (@ 3200)	60 (@ 3000)	65 (@ 3400)	50 (@ 2800)	70 (@ 3200)
Weight per hp. 4-door sedan	38.6	44.1	46.2	38.4	48.0	32.0
Weight per cu. in. displ. 4-door sedan	14.2	14.6	14.3	11.3	11.9	15.3
Compression ratio	5.5	4.9	5.2	5.5	4.6	5.8
Wheelbase	107 in.	112 in.	109 in.	106 in.	106 in.	106 in.
Tread	56¼ in.	56 in.	56 in.	56 in.	56 in.	54 in.
Net weight (4-door sedan)	2700	2875*	2770*	2495	2398	2250
Rear axle ratio	4.375	4.33	4.1	4.11	3.77	4.11
Free wheeling	yes	yes	yes	no	no	yes

* Shipping weight.

Mechanically, the new Plymouth Six has more sales features than any car introduced to date in its price class. Floating power, of course, will remain a major talking point for Plymouth dealers.

The complete six-cylinder engine is replete with new features. Valve grinding is reduced to a minimum and seat-pounding virtually prevented, it is claimed, by the adoption of tungsten-chrome-nickel alloy exhaust-valve seats inserted in the

The new Plymouth Six four-door sedan, listing at $575

cylinder block. This is the first time this feature is being offered in the low-priced field.

Connecting rods are not babbitted at the big ends, but instead are fitted with quick-replaceable, thin-walled, steel-backed, babbitt-lined bushings similar to the main bearing bushings which have become popular during the last year or so. These also make their appearance in the low-priced field for the first time on the new Plymouth Six.

Cylinder blocks are cast integral with upper crankcase halves in the conventional manner. Crankshafts are of the four-bearing type, with steel-backed interchangeable liners, assembled without subsequent reaming.

Bearing loads are reduced by the use of counterweights forged integral with the shaft, and torsional vibration is controlled through an impulse neutralizer on the front end of the shaft.

Connecting rods, for the purpose of accurate fitting of the new big-end liner, are diamond-bored, at the same time the bore for the piston-pin bushing is similarly finished. The new shells, incidentally, are copper-plated to prevent oxidation from crankcase fumes.

Pistons are of aluminum alloy, with T-slots in the skirts, and are cam-ground, with less clearance on the thrust faces than at right angles thereto. The T-slot is not continued all the way to the bottom of the skirt, in order not to weaken the structure.

Piston pins float and are held by spring snap-ring retainers at the ends. There are four rings per piston, including two compression, one oil scraper, and one oil-control ring. The upper three are 1/8 in. wide, while the oil-control ring is 5/32 in.

As usual with Chrysler engines, two types of cylinder heads are available, the standard-ratio head, with 5.5 to 1 ratio, and the higher compression "Redhead," for the use of anti-knock fuels. Camshafts are supported by four bearings and are driven through a short silent chain.

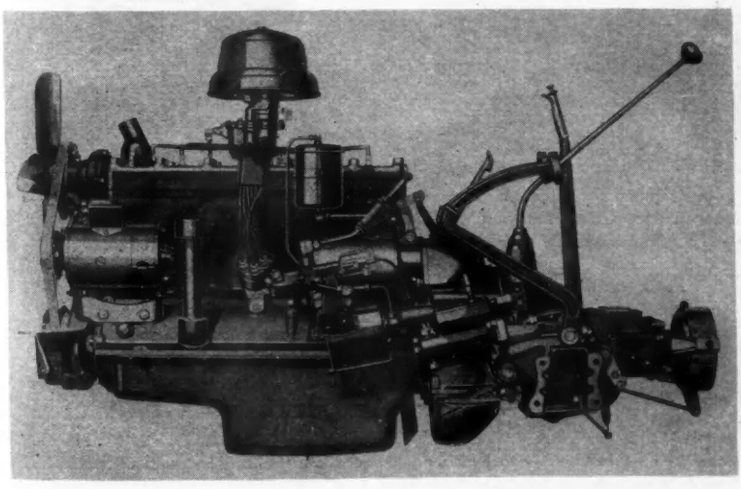
Cam followers are cast iron welded to steel tappets. Both intake and exhaust valve are 1 15/32 in. in diameter. The former are of chrome-nickel steel, and the latter of Silchrome No. 1. A wide circular groove is cut in the lower end of the valve stems to break the oil seal in the valve guide. It coincides with a chamfer in the lower end of the guide as the valve rises, and prevents oil being drawn into the combustion chamber during the intake stroke. Valve springs are made of Swedish steel, with variable pitch coils to prevent "flutter."

In the heat jacket between intake and exhaust manifolds is to be found a thermostatically controlled valve to provide the correct amount of exhaust heat for the intake gases. The valve is closed during normal operation following the warming-up period, for maximum performance.

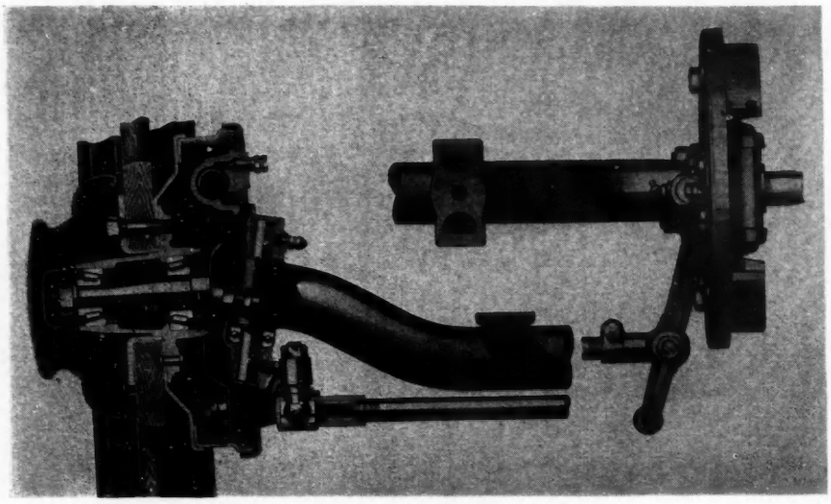
Downdraft carburetion is another feature of the new Plymouth Six. The choke valve incorporates a secondary valve which allows air to flow through the carburetor when fully choked as soon as the engine fires. This should aid starting, while also providing insurance against overloading the manifold by overchoking. As a further protection and aid, the throttle is interconnected with the starter pedal, and is automatically opened to the proper point when the starter pedal is pressed. The carburetor is provided with an accelerating pump for enriching the mixture for quick acceleration.

On top of the carburetor is located a new bell-shaped combination intake silencer and air cleaner, the latter being of the oil impregnated copper mesh screen type. Fuel feed is through a camshaft-operated pump, provided with an air dome to maintain an even fuel pressure.

Full-pressure lubrication is used in this engine, with the exception of piston pins.



Left side view of the new Plymouth engine showing the installation of the latest Bendix automatic clutch control



Detail of the new tubular front axle. Note how the drag link parallels the axle rather than the frame

Oil leads are all through drilled holes. Protection for the oil is two-fold—through an oil filter, and by a ventilator having its inlet through the oil filler pipe at the left front and its outlet at the right rear. A copper mesh "air cleaner" is located in the oil filler pipe cap.

The oil pump is located outside the crankcase, and is driven from the camshaft by an inclined accessories shaft. This location makes it readily accessible for servicing. At the other end of the accessories shaft is the distributor.

In the new floating power mounting the torque spring formerly used has been eliminated. Its place is taken by a rubber pad at the rear of the engine. The rear support, incidentally, is now above rather than below the transmission case, the change having made it possible to lower the front mounting somewhat.

The clutch remains of the same general design, but torsion springs are now provided to cushion the transmission, etc., and automatic clutch control has been added, incorporating a "cushioning" control valve in the form of a pendulum. The trapped air in the clutch control cylinder is piped back to the plunger-type control valve. Here its escape is controlled by two factors, viz., the position of the control valve (determined by the position of the accelerator pedal) and, subsequently, by the cushion control valve.

This valve functions almost like a synchronizer between engine and chassis. If the engine is running faster, relatively, than the car, the tendency, when the clutch is engaged, is for the car to "jerk" forward. In the new control the beginning of such a forward acceleration produces an immediate swing of the pendulum, shutting off the trapped air or cutting down its flow, to prevent too sudden an engagement.

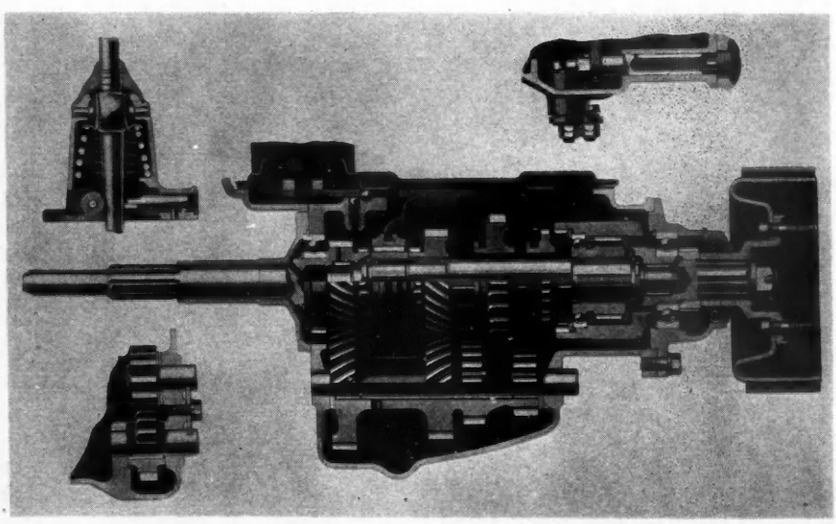
The same thing occurs when the engine is running too slow; the pendulum then swings forward and throttles the escape of the trapped air in the control cylinder, thereby,slowing up the rate of engagement.

The Plymouth Six transmission is also new, and a feature is the enclosing of the free-wheeling unit within the transmission. Controls for the automatic clutch and free-wheeling unit are so arranged that one or the other or both can be used at the will of the operator. The number of rollers in the free-wheeling unit has been increased. Countershaft drive and second-speed gears are of the helical type. The countershaft gear cluster is carried on roller bearings while the main shaft is on ball bearings. The gear-shift lever is located ahead of the transmission, projecting up through the toeboard of the front compartment.

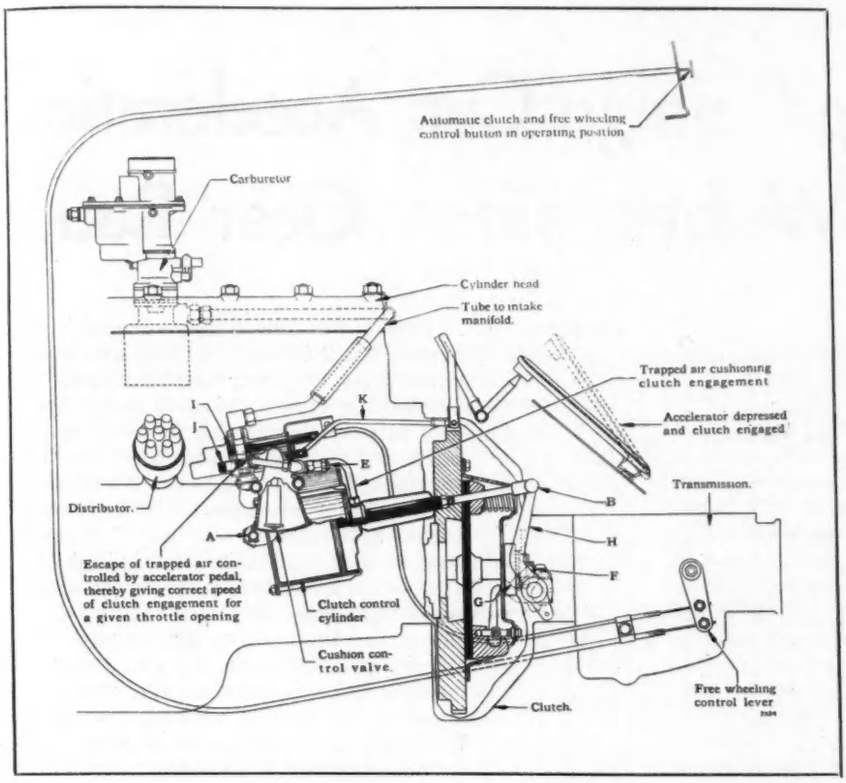
The parking brake drum is carried on an extension of the transmission main shaft at the rear. Universal joints are of the needle-bearing type developed by Universal Products Co. and do not require lubrication after installation. The joints are described on page 625 in this issue. An interesting feature of these joints is that fore and aft motion is taken care of in each joint without the use of splines.

Rear axles do not differ materially in general design from those used in the previous series. The tread is 56¼ in. front and rear. The steering gear proper is located near the front of the engine, and the drag link extends parallel with the front axle rather than parallel with the frame.

It is claimed that this arrangement eliminates road-shock. An important result of the change in the steering layout is the greater inclination of the steering



(Domestic) the cam and roller free-wheeling unit is now located inside the Plymouth transmission



Details of the new Bendix clutch control, showing the automatic cushioning control valve

Export Transmissions Have Helical Constant-Mesh Gears

The transmission furnished for export models is of unusual interest. In this unit helical constant-mesh gears are used for all speeds, including the reverse, so that it should be just about as silent a transmission as can be found. Such a transmission previously had not been used in any car within $1,000 of Plymouth's price, in this country.

Synchronizing cones are not used in this transmission, since the easy shift provided by toothed clutches is made still easier by the incorporation of a cam and roller-type free-wheeling unit within the transmission case, and the provision, at only nominal extra cost, of a built-in automatic clutch control. Clutch and free-wheeling controls are so arranged that either one or the other or both can be used at the option of the operator. The gear-shift lever, as formerly, is mounted on a frame cross-member, and is in contact with the transmission assembly only while shifting gears, thereby preventing transfer of engine movement (with floating power) to the shift lever. Anti-friction bearings are used for both countershaft and main shaft in the new transmission.

wheel. A ratio of 14 to 1 is provided by the worm-and-wheel steering gear. Two tapered roller bearings support the worm shaft, and an oilite bushing is provided for the wheel shaft. King pin thrust bearings are of the ball type, with bronze bushings for the pins themselves.

Front axle weight has been reduced by the use of a tubular axle center with welded-on spring pads. Centrifuse brake drums are continued. Operating cylinders are made ⅛ in. larger in diameter on the front than on the rear wheels, to increase the braking action at the front in proportion to the weight transfer that occurs while applying the brakes.

Another new feature is to be found in the springs. These carry oilite inserts between the leaves at their ends to reduce inter-leaf friction and prevent squeaks. There are Silent-U shackles at the front ends of both front and rear springs.

The X-type frame of the last Plymouth series is continued in the Plymouth Six, but has been improved in detail. Secondary frame channels extend forward to the front spring horns to form a box section side rail. The front cross-member flares forward and back at both side-rails. There are two other cross-members, one at the extreme rear, the other just ahead of the X and forming the rear support for the powerplant.

Nine Years Ago—and Today

	Chrysler Six 1924	Plymouth Six 1933
Price, 4-door 5-pass. Sedan	$1,625	$575
Wheelbase	112	107
Weight	3,195 lb.	2,700 lb.
Price per lb.	50.8c	21.3c
Bore	3 in.	3⅛ in.
Stroke	4¾ in.	4⅛ in.
Piston Displ.	201 cu. in.	189.9 cu. in.
B.h.p.	68 (@ 3,200 r.p.m.)	70 (@ 3,600 r.p.m.)
Hp. per cu. in.	0.34	0.37
Weight per b.h.p.	47 lb.	38.6 lb.
Comp. Ratio	4.6 to 1	5.5 to 1
Front Drive	Chain	Chain
Lubrication	Pressure	Pressure
Rear Axle Ratio	4.6	4.375
Brakes	4-wheel, hydr.	4-wheel, hydr.

Calculated Time of Acceleration from 10 to 30 m.p.h.

(Based on theoretical formula developed by Mr. Heidt—see page 616)

	Plymouth 6	Plymouth 4	Chevrolet	Ford 8	Ford 4	Terraplane
Tire Size	17/5.25	18/5.25	18/5.25	18/5.25	18/5.25	17/5.25
Time of acceleration*	9.22	9.90	10.10	9.72	11.35	7.15

* 400 lb. added to net weight for total weight of car and load in test.

Car Acceleration Gear Ratio,

by P. M. Heldt

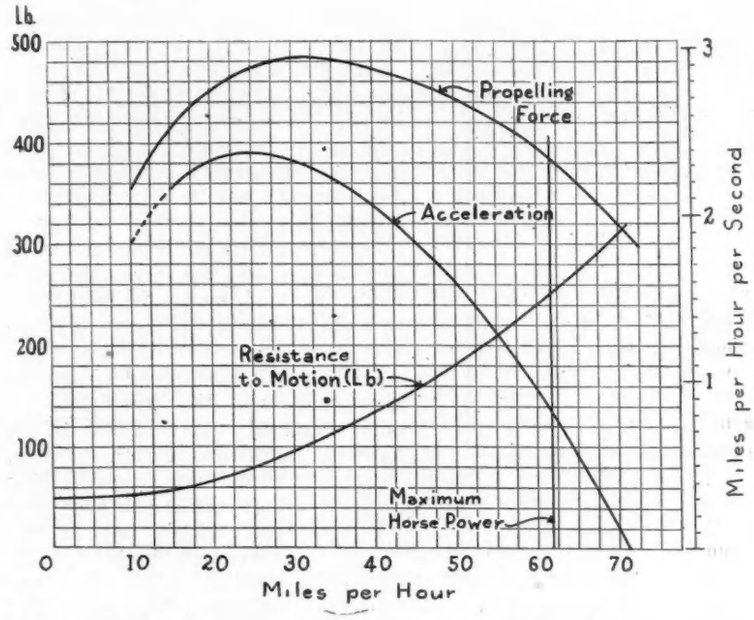


Fig. 1—Curves of propelling force, resistance to motion, and acceleration for a typical light car under full throttle in high gear

NOW that the maximum speed of passenger cars have attained such values that it is very rarely possible to utilize them, the maximum acceleration in high gear has become the feature with respect to which there is most rivalry among car manufacturers. High acceleration is of importance particularly on narrow roads, where, if there is considerable traffic in both directions, it is difficult to overtake slow-moving vehicles ahead unless one's own car possesses this characteristic. It is advantageous also in city driving where traffic lights abound. Wherever frequent stops have to be made the average speed attainable depends to a considerable degree upon accelerating ability.

The maximum acceleration of a car depends chiefly on the proportion of its engine torque to its loaded weight, and on its rear-axle gear ratio and the diameter of its driving wheels.

Let P be the maximum horsepower of the engine;
N, the speed in r.p.m. at which this power is produced;
r, the rear axle gear ratio;
D, the wheel diameter in inches, and
W, the weight of the car with load.
The engine torque then is

$$T = \frac{33{,}000\,P}{6.28\,N} = 5250\,\frac{P}{N}$$

This is the torque at maximum horsepower, but it is obvious from any torque curve that at lower engine speeds the torque is greater, and if it is desired to determine the maximum value of the acceleration, some allowance must be made for this difference between the torques at maximum horsepower and at maximum acceleration. It will be shown later on that the acceleration in high gear attains its maximum value at an engine speed somewhat less than the speed at which the engine develops its maximum torque, which is due to the fact that with increase in engine speed (and, therefore, in car speed) the air resistance increases. When the torque approaches close to its maximum value, it increases very slowly —less rapidly than the air resistance. From the curves shown in Fig. 1, which are representative of an actual modern car, it appears that the engine torque at the speed of maximum acceleration in high gear is about 22 per cent greater than the engine torque at maximum horsepower; hence the engine torque at the speed of maximum acceleration is

$$1.22 \times 5250\,\frac{P}{N} = 6400\,\frac{P}{N}$$

A certain fraction of this torque, however, is consumed in driving engine accessories such as the water pump, fan and generator, and in overcoming friction in the transmission members. This loss may be set down as 10 per cent, hence the torque at the driving wheels, which is equal to the product of the engine torque less loss in transmission, etc., into the reduction ratio r, is

$$0.9 \times 6400\,\frac{P\,r}{N} = 5760\,\frac{P\,r}{N}$$

Since this torque on the wheels acts on a lever arm $D/24$ ft. long, the propelling force at the circumferences of the wheels is

$$\frac{5760\,\dfrac{P\,r}{N}}{\dfrac{D}{24}} = 138{,}000\,\frac{P\,r}{N\,D}$$

Of this propelling force a certain amount is required to overcome the rolling resistance and the air resistance. The rolling resistance on a smooth, hard, level road may be set down as 20 lb. per thousand, while the air resistance may be found approximately from the equation

$$R_a = 0.024\,A\,V^2 \text{ lb.},$$

Determined by Engine Torque, Wheel Diameter and Weight

where A is the projected frontal area of the car and V the speed in miles per hour. In Fig. 1 the lowermost curve represents the combined rolling resistance and air resistance for a car weighing 2500 lb. with two passengers, and which has a frontal area of 22 sq. ft. The uppermost curve represents the propelling force at the circumferences of the tires on the driving wheels. The difference between these two forces for any particular car speed is the force available for acceleration at that speed, and this is shown by the intermediate curve. This curve shows that if the car is accelerated from a comparatively low speed, say 10 m.p.h., in high gear, with the throttle wide open, the acceleration will gradually increase at first, but it will soon reach a maximum value, which in this case occurs at about 25 m.p.h. It will be seen from the chart that the resistance to motion at this speed (rolling resistance and air resistance combined) amounts to about 80 lb., and since the car with its passengers weighs 2500 lb., this corresponds to 32 lb. per thousand. It is true, of course, that the air resistance is not directly proportional to the weight of the car but depends upon the frontal area and the general form, particularly of the body, but it is not far from the truth to assume that the frontal area varies with the weight of the car, and there is, of course, not much difference in the general forms of different modern cars of conventional design. We may therefore assume that the resistance to motion of the car at the speed at which the acceleration under full throttle attains its maximum is 32 lb. per thousand, or 0.32 W. Subtracting this from the total propelling force available, we have for the force available for acceleration under full throttle at the speed at which the acceleration is a maximum—

Getaway is the subject of greatest rivalry among car manufacturers. Here is a means of calculating a car's ability without a stop watch

$$F = 138{,}000 \frac{Pr}{ND} - 0.032\ W.$$

Now, if a force F acts on a mass W, the resulting acceleration of the latter is $32.2\ F/W$. Hence, the acceleration which should be produced in our case is

$$A_m = 4{,}450{,}000 \frac{Pr}{NDW} - 1.03 \text{ ft. p.s.p.s.}$$

It is more convenient to express the acceleration in miles per hour per second, and since 1 mile per hour per second is equal to 1.4666 ft. p.s.p.s., the equation transforms to

$$A_m = 3{,}035{,}000 \frac{Pr}{NDW} - 0.70 \text{ m.p.h.p.s.}$$

We have been assuming here that all of the power available for acceleration is utilized in accelerating the linear speed of the car. This, however, is not correct. The wheels, for instance, have both a motion of translation and a rotary motion, and they have kinetic energy stored up as a result of each of these motions. Consequently, if the speed is increased the kinetic energy due to the motion of translation and also the kinetic energy of the rotary motion must be added to. There are many other parts having a rotary motion whose speed of rotation increases in direct proportion to the car speed. The more important of these include the engine crankshaft, engine flywheel, clutch, transmission gears and driving shafts. Some of the power available for acceleration is, of course, consumed in the acceleration of the rotary motion of these parts, and since the rotary motions always vary in the same proportion as the speed of the car, so long as the car is driven in a particular gear, for a given car a certain fraction of the total accelerating force is utilized in accelerating the rotating parts. The weights and moments of inertia of these rotating parts are more or less proportional to the weight of the car, and from the results of acceleration tests on a number of cars and calculations as outlined in the foregoing, it appears that the proportion of the propelling force available for acceleration which is used in accelerating the rotary motions is about 10 per cent. Hence, only 90 per cent of the total propelling force available for acceleration is effective in accelerating the linear speed of the car, and the equation for maximum car acceleration then becomes—

$$A_m = 2{,}750{,}000 \frac{Pr}{NDW} - 0.525 \text{ m.p.h.p.s.}$$

It has become the practice to express the accelerating ability of a car in high gear in terms of the minimum time in seconds required to accelerate it from a certain minimum speed to a definite higher speed, as, for instance, from 10 to 30 m.p.h. Since the torque of the engine varies with its speed, the total propelling effort available also varies with the speed, and it is found by averaging the propelling-effort ordinates over the speed range 10-30 m.p.h. in Fig. 1 that the average total propelling force over this speed range is about 93 per cent of the total propelling force at the speed

of maximum acceleration. This affects the left-hand term of the equation for acceleration, whose numerical coefficient becomes

$$0.93 \times 2{,}750{,}000 = 2{,}550{,}000$$

Also, the air resistance varies rapidly with the speed. At the speed of maximum acceleration we figured with a combined rolling and air resistance of 80 lb., or 32 lb. per 1000 lb. of car weight. Over the speed range 10-30 m.p.h., the combined rolling and air resistance has an average value of 72 lb., or 28.8 lb. per 1000 lb. of car weight. This affects the right-hand term of the equation for acceleration, which becomes

$$\frac{32}{28.8} 0.525 = 0.47$$

Hence, the average acceleration over the speed range 10-30 m.p.h. can be expressed by the equation

$$A_{10\text{-}30} = 2{,}550{,}000 \frac{P r}{N D W} - 0.47 \text{ m.p.h.p.s.}$$

The time required for accelerating from 10 to 30 m.p.h. then is

$$t_{10\text{-}30} = \frac{20}{2{,}550{,}000 \frac{P r}{N D W} - 0.47} \text{ seconds}$$

In some cases it may be more convenient to base the calculation on the piston displacement than on the horsepower of the engine, but in that case the brake mean effective pressure at maximum horsepower must be taken into account. Most modern American passenger car engines at the speed of maximum horsepower under full throttle develop a.b.m.e.p. of between 80 and 85 lb. p. sq. in. For the former figure the equation for the time of acceleration from 10 to 30 m.p.h. becomes

$$t_{.0\text{-}30} \quad \frac{20}{258 \frac{V r}{D W} - 0.47} \text{ seconds}$$

where V is the piston displacement of the engine in cu. in. The coefficient in the denominator of the fraction becomes 275 for a.b.m.e.p. of 85 lb. p. sq. in.; 240 for 75 lb. p. sq. in. and 290 for 90 lb. p. sq. in., which latter is about the limit for unsupercharged engines.

For the speed range 10-40 m.p.h. the average total propelling force is about 96 per cent of the total propelling force at the speed of maximum acceleration, and the coefficient of the left-hand term in the equation for acceleration becomes 2,640,000. The average value of the combined rolling and air resistance over this speed range is 86.7 lb. or 34.6 lb. per 1000 lb. of car weight, hence the value of the right-hand factor in the equation becomes

$$\frac{34.6}{32} 0.525 = 0.57$$

and the equation for the time required to accelerate from 10 to 40 m.p.h. becomes

$$t_{10\text{-}40} = \frac{30}{2{,}640{,}000 \frac{P r}{N D W} - 0.57} \text{ seconds.}$$

The foregoing equations apply only to cars having maximum speeds of between 65 and 80 m.p.h.

It must be admitted that not a very high degree of accuracy can be claimed for these equations, because they are based upon a considerable number of assumptions which in most cases at least are not absolutely correct. In the first place, the horsepower rating may not correctly reflect the performance of the engine in the car. For instance, the rated horsepower may have been obtained with a special carburetor setting for a rich mixture which would not be desirable in regular operation because of its effect on economy; then this horsepower may have been attained with very little heat to the carburetor, which would assure a higher volumetric efficiency than is obtained in regular service, where the mixture must be well heated to assure satisfactory idling. Finally, the rating may apply to the net power of the engine when driving such accessories as the water pump, fan and generator, or it may apply to the gross output.

The ratios between the torque of the engine at the speed of maximum output and the mean torques over certain speed ranges of the car which were obtained from Fig. 1 will not apply with absolute accuracy in all cases. Then the proportional loss in the drive is different in different cars, and, finally, the proportion of the air resistance at any particular speed to the weight of the car varies in different cars.

In spite of these chances for error it is believed that the formulas give about as accurate results as the equipment usually employed for making acceleration tests. These usually comprise the speedometer and a stop watch. Now, on many cars the speedometers are set to "read fast." Besides, speedometers have inertia and when the car speed is increasing the pointers of the instruments lag behind. Finally, there are sources of possible error in the times of starting and stopping of the stop watch.

The equations undoubtedly can be used to best advantage in judging the effect of variations in the engine torque, rear-axle ratio, wheel diameter, and total load on the acceleration of a given car. If only a single factor affecting the acceleration is changed and the variation of that factor is known, there is little chance for error.

Theory of Chromium Plating

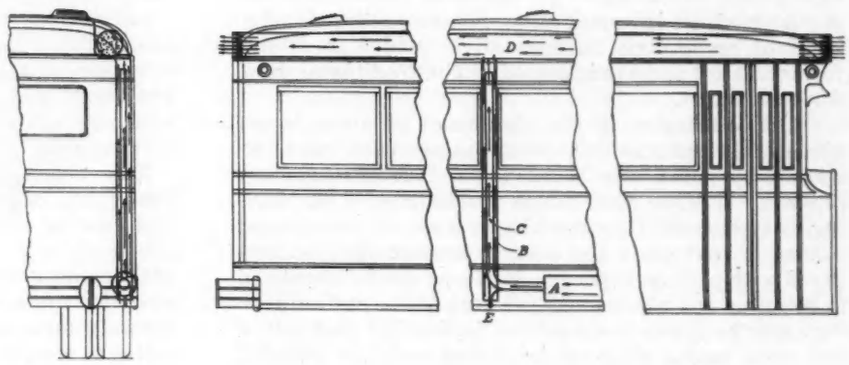
CHROMIUM plating is now extensively applied on automobiles and household appliances. The solutions are simple and fairly cheap, but the electrical efficiency is low. The purpose of an investigation, recently completed at the Bureau of Standards, was to develop a theory of the process, in the hope that improvements in it might thereby be promoted.

Although the plating baths consist principally of chromic acid, a small amount of sulphate is also necessary. In this research it was shown that the beneficial effect of the sulphate is caused by the fact that it prevents the formation of an impervious film on the cathode and thus permits metal deposition. It was found possible to explain satisfactorily all the principal facts of chromium plating in terms of this theory and to make certain predictions which were experimentally confirmed. There is, however, no present prospect of any very large increase in the efficiency of this type of bath, but the above theory may aid in the development of other more efficient types.

Flues Suggested to Dilute Motor Coach Exhaust Gases

Passengers and pedestrians by this scheme would be protected from the disagreeable exhaust odors

by A. J. Scaife
Consulting Field Engineer
The White Motor Company



Drawing of coach body showing the arrangement of flues for diffusing the exhaust gas

THE accompanying drawings illustrate an exhaust system for motor coaches which was mentioned by the writer at the S.A.E. Transportation Meeting at Toronto. The drawings show a conventional coach body in front, center and rear sections, with the exhaust rising from the muffler A up the side and center of the body through a tube B large enough to provide air space around the exhaust pipe C. This exhaust then discharges into a flue D, running the entire length of the coach and is laid out in a ratio of about 10 to 1; i.e., one part exhaust to 10 parts air. The exhaust from the muffler produces an injector effect, carrying the air and exhaust into the air stream of the main flue.

This scheme can be used on one side or both sides of the coach; it is preferably used on both sides, as in that way the exhaust can be divided and will be much easier to dissipate.

The exhaust from the engine upon entering the atmosphere, regardless of whether it comes out at the side of the body, around the wheels or around the back, is always slightly heavier than the atmosphere and lingers for a considerable time at the breather line, until it becomes saturated with air, and then it disappears. The theory is that if the exhaust could be treated to a liberal portion of fresh air before it is released to the atmosphere, it would rise immediately above the breather line of pedestrians and the traffic following the vehicle. This, of course, is just the theory upon which this whole scheme is predicated.

When the coach is traveling in the forward direction, air will enter through the louvered or grid part of the main flue D and meet the exhaust at the center of that flue; it will continue on to the rear end, where it will be broken up in passing through the louvers or grid there, before being discharged to the atmosphere.

When the coach is standing and subjected to a tail wind, air will enter the main flue D at the rear, will take up the exhaust gas at the center, and pass out through the forward louvers or grid, being released to the atmosphere as a mixture of air and exhaust gas. It will be carried forward from the front end of the bus, and it should rise immediately on being discharged, so that passengers entering the coach will not receive any of it.

When the coach is standing, regardless of which way the wind is blowing, the fumes will be carried to the front or to the rear, while when the coach is moving they will be always carried toward the rear. The vacuum at the rear of the coach while the latter is traveling at high speed may tend to pull the exhaust down, but even so, it would be mixed with considerable air, and therefore would not be as objectionable as at present. This condition would exist only while traveling at high speeds, which is usually out in the open country, and would not inconvenience the coach passengers nor those of following vehicles in any way.

It will also be noted that the exhaust pipe C entering the side flue B is provided with an opening E extending below the side flue B so that the condensation or liquid of any kind in the muffler will drop through this outlet to the ground and will not be carried to the roof.

Essex Slashes Camshaft Cost W

Tests made by Michigan State College show the new material to have high tensile and torsional strength and resistance to wear and fatigue

MORE than 248,000 miles gruelling, hard-bitten miles, on a group of Essex Terraplane test cars had to be taken without a whimper before the new camshaft was accepted by Hudson executives. Its adoption marked another stepping stone in automotive progress—the development of an electric furnace alloy molded in special forms of steel and sand instead of the traditional drop-forged product.

Our unceasing quest for significant advances in engineering, manufacture, and management was rewarded by permission to tell about this revolutionary product. It offers remarkable possibilities of cost-saving. An element of greatest importance to the engineer is that of savings in the cost of forging dies, as compared with pattern expense. Patterns can be completed in less time and at about 25 per cent of the cost of dies. Perhaps the greatest appeal lies in the fact that minor and even major changes in design may be effected without delay and at slight expense.

Much has been said of late concerning the outlook for camshafts and crankshafts cast in molds rather than forged. In fact a number of important car builders have tried one or both parts in limited production. But apparently, Hudson is the first to overcome the metallurgical as well as production problems and to put the camshaft through production on a 100 per cent basis.

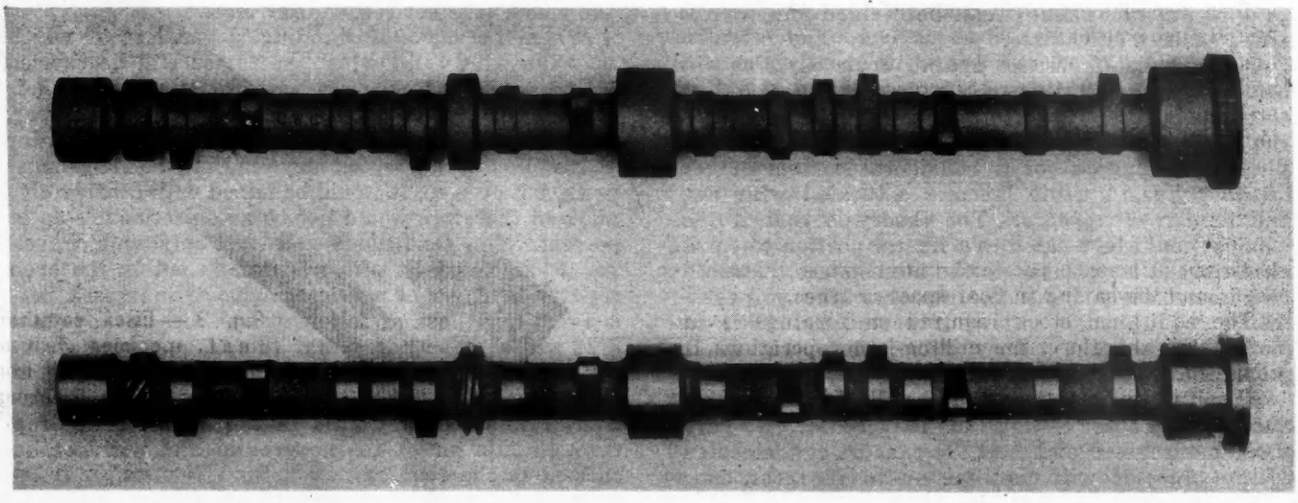
At any rate, Hudson is the first to make a full and informative announcement to the automotive world.

Credit for the metallurgical and foundry development goes to the house of Campbell, Wyant & Cannon Foundry Co., of Muskegon, who need no further introduction to our readers. The material from which this camshaft is made is an electric furnace, alloyed iron made and supplied by them under the registered and coyprighted trade name, "Proferall," (processed-ferrous-alloy).

The development of Proferall dates back about five years, although the experimentation on molding and casting methods goes back to 1924. Shafts are produced in a combination mold of metal and sand, with chilling surfaces for the nose of the cams and eccentric surfaces. The material comes in three grades known commercially as "X," "XX," and "XXX," indicating a tensile strength of 50,000, 60,000, and 70,000 lb. per sq. in. respectively. Grade "X," the composition of which is given in Table 1, is used in camshaft production.

As the chemical analysis indicates, the material is an alloy of particular merit. Test results said to be

Fig. 1—Proferall (electric furnace alloy iron) camshaft used on the Essex Terraplane. Note the burnished finish of bearing surfaces after finish-grinding



st With Electric Furnace Alloy

by Joseph Geschelin

Fig. 2—Structure of grade X (50,000 lb. per sq. in., tensile) Proferall magnified 750 x. Etched with 10 per cent solution HNO3 in alcohol. This structure is a sorbitic—martensitic combination

authenticated by the Michigan State College, show remarkable values for tensile and torsional strength as well as resistance to wear and fatigue.

From the production standpoint, the new camshaft offers many decided economies. As received, the bearings and unchilled portions average around 300 Brinell; chilled surfaces of cams and eccentrics average about 75 sclerescope. Consequently, the costly and lengthy operations of copper-plating and heat-treating are eliminated. This comprehends also the elimination of related operations such as packing in carburizing pots, handling, and the consequent straightening.

On the economy side, we may also include the saving due to the elimination of the heat-treating equipment, plating equipment; fuel and maintenance charged to these, and the saving in floor space charges.

The additional stock required on forgings is unnecessary; therefore, the milling-lathe operations for rough-turning are dispensed with. Cam width is so well controlled that the straddle-milling operation also is out.

It comes down to a matter of rough and finish-grinding cams, eccentric, and bearings. Even these fast operations are further facilitated by the fact that the cams, bearings and eccentric are accurately spaced as received; moreover, the ends are centered at the foundry so as to register with the cam location.

Perhaps no better picture can be had of the speed and economy of fabrication than the statement that a shaft received in the morning conceivably may be in an engine on the test block that same day.

For the engineer, this material has great attractiveness not only because of its fine physical properties and low cost but for several other important reasons.

Bearing diameters may be larger without approaching the temperatures reached in ordinary camshaft practice. Moreover, the bearing clearance is materially reduced, thus making for a more quiet running job at the very start.

Another important feature is that spiral gears for accessory drives may be cut wherever necessary. Naturally, this involves production problems of no mean proportions as will be evident for Hudson's experience. But it is practicable and relatively inexpensive, whereas integral gears are difficult if not impractical on forged shafts. Engineers will welcome this added flexibility in design.

Speaking of the production problems involved, we might mention that the spiral gear cut at the left in Fig. 1 was finally worked out on a Barber-Colman hobber. It requires a special

Table I
Chemical Composition
(Proferall X)

	Per Cent
Silicon	2.20-2.35
Sulfur	0.10 max.
Phosphorus	0.20 max.
Manganese	0.50-0.65
Comb. Carbon	0.55-1.00
Total Carbon	3.15
Nickel	0.40-0.50
Chromium	0.80-1.00
Molybdenum	0.40-0.50

Fig. 3 — Essex camshaft test specimen twisted through an angle of four degrees before breaking. Ultimate torsional strength of this specimen, 25,000 lb. per sq. in.

Table 2

Physical Properties

(Proferall X)

Tensile strength (min.)	50,000 lb. per sq. in.
Torsional strength (4 deg. twist)	25,000 lb. per sq. in.
Transverse test (12 in. specimen) Deflection 0.23 in.	6,000 lb. per sq. in.
Fatigue resistance	4 to 5 times that of SAE 1020
Ultimate compression	153,000 lb. per sq. in.
Specific gravity	About 7 per cent less than that of steel
Brinell hardness (Unchilled)	About 300

hob with a length equal to the length of the gear face. And the gear is fed down into the hob—instead of feeding across as is customary!

The gear near the center bearing is cut with a hob on a thread-miller.

Physical properties of this material should prove of great interest to engineers. It has a minimum tensile strength of 50,000 lb. per sq. in. with a yield point very close to the ultimate strength, whereas a specification steel giving a tensile test of 60,000 lb. per sq. in. sometimes shows a yield point of only 28,000 to 30,000 lb. per sq. in.

Torsional tests made with standard test bars indicate 25,000 lb. per sq. in. and develop an angle of twist of 4 deg.

Results obtained through hundreds of transverse tests of standard 12 in. test bars indicate an average resistance of 6000 lb., with a deflection of 0.23 in. Both figures may be varied to meet users' specifications.

One of the extraordinary characteristics of Proferall as shown in laboratory and practical tests is its fatigue resistance. Comparison on this basis shows fatigue life 3 to 4 times greater than SAE 1020 steel.

Wear tests, like fatigue tests, have been made both in the laboratory and in actual road tests and range from 50,000 to 122,000 miles at high speeds. Certified calibration shows maximum wear to be less than 0.0003 in. in all cases; steel shafts in equal mileage tests and under the same conditions showed an average of 0.001 in. to 0.0015 in.

One cause for wear is expansion of the shaft material under service conditions. The enlargement of Proferall is not as great as that of steel and for this reason the allowances provided in bearing fits for lubrication are not absorbed by expansion; therefore the film of lubricating oil serves its purpose continuously in protecting both shaft and bearing.

The development of this new camshaft answers two important questions asked by people within as well as without the automotive industry. Has research continued during the depression? And how can the car builder offer a better product for less money?

The foregoing is a positive answer to both. Savings on this one item alone are of great consequence particularly when building a new plant or rehabilitating the existing facilities. It means the elimination of much expensive equipment; accessories that go with it; and releases much needed floor space for other productive activities. Routine savings in process and original tooling are obvious.

This development helps to focus attention upon the role and importance of research in the automotive field. A revolutionary step such as this camshaft would be unheard of were it not for the cooperative research programs of suppliers and users. For obviously, the supplier in this case had much to learn from the field service and production problems of the car builder.

Table 3

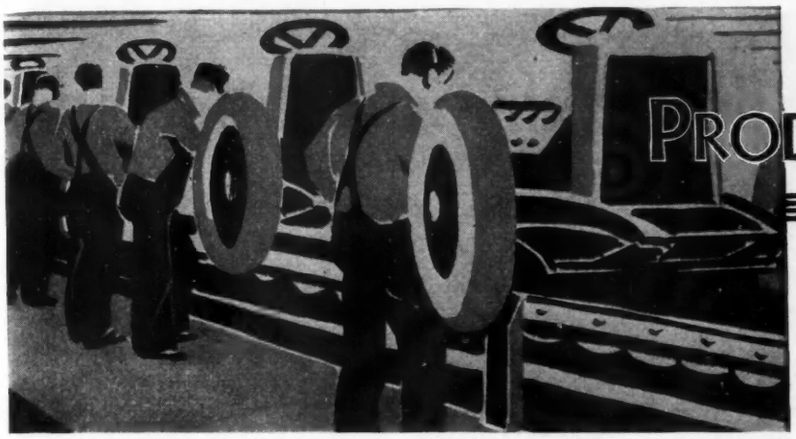
Operation No.	Description
1.	Rough inspection
2.	Sand blast
3.	Snag all burrs between cams
4.	Grind two steady rest bearings
5.	Rough turn 3 main bearings and 2 gear diameters
6.	Space bearings and flange and chamfer
7.	Drill ½, ream 33/64 and countersink hole, face flange
8.	Turn O.D. and chamfer flange and undercut front bearing diameter
9.	Chamfer and recenter small end
10.	Mill ¼ in. slot.
11.	Drill 3 holes in flange
12.	Countersink 3 holes in flange
13.	Tap 3 holes and place truck on rack
14.	Finish turn 3 bearings and 2 gear diameters
15.	Polish centers
16.	Rough grind center bearing
17.	Rough grind rear bearing
18.	Rough grind front and bump inside of flange
19.	Finish grind center bearing
20.	Finish grind rear bearing
21.	Finish grind front bearing and finish bump flange
22.	Finish grind O.D. of flange
23.	Finish grind front face of flange
24.	Rough and finish grind all cams
25.	Cut double thread worm
26.	Cut helical gear
27.	Mill off top of thread of worm to remove sharp thread four places
28.	Remove burrs, polish all cams and bearings and round cams

New Line of Worthington Gas Engines

A NEW line of gas engines for industrial and general power purposes placed on the market by the Worthington Pump and Machinery Corp., are so designed that they can be converted to Diesel engines without too much expense.

A fuel pump and spray valves replace the magneto or battery and spark plugs. Mixing valves used on the gas engines are omitted.

Diesel cylinders with smaller valves in the head are substituted for the gas-engine cylinders. The engines, therefore, need not be completely replaced if it should become necessary to substitute fuel oil for gas.



PRODUCTION LINES

Eternal Change

Behind the curtain Detroit is undergoing a swift change in scenery. True, there is much evidence of short-sighted patching and temporary rebuilding. But in certain important plants something big is taking place. They're scrapping traditions of only a few years standing. Changing conveyors that were supposed to be the last word; installing machine tools so new that few know about them; casting out the old. Progress demands change—it is ruthless in its march.

By Twos

Cylinder blocks are being cast in pairs from one mold by a certain well-known foundry in Detroit. Startling, isn't it? Yet the block is a beautiful piece of work. We admired particularly the narrow oil slinger groove which was as clean and as true as a milled groove.

Page Vizetelly

What with new materials coming in, a man has to choose his words carefully. For instance, what is brittleness? Today, certain materials such as the cemented carbides are brittle only if we mean that they aren't capable of taking bending. Actually this stuff has unusual compressive strength and is indispensable in machine shop practice. All it needs is adequate protection against bending principally by reducing overhang in the tool holder.

What—a Casting

No longer is a cast camshaft and even crankshaft merely a rumor. Quite a number of important car makers have studied the new process—and have put it through in at least limited production. Economies are startling as compared with the drop-forged product. Heat-treating, turning, copper plating, and other operations are out. The new product is made possible by the electric furnace. Castings are hard without chilling except at certain points such as the heel of the cam. The material contains important alloys which take it out of the cast iron class entirely.

Product of Research

At the DAStuart booth in the National Metal Exposition they were using Mougey E-P lubricant tester No. 8 to demonstrate the effectiveness not only of E-P lube but also of cutting oils. Here is a fine way of showing the kinship of the lubricating and cutting action. It measures in a positive fashion the virtues of the new sulfurized and chlorinated cutting oils.

Hardness vs. Abrasion

Then there is the business of associating resistance to wear with extreme hardness. It is largely true of familiar materials. But now we have an alloy of noble metals which is comparatively soft, yet offers more resistance to wear than a hardened alloy steel.

On Looks

Again some one brought up the question of eye appeal in productive equipment. True, we associate quality and utility of engineering structures with their appearance. And a good-looking tool has unquestioned advantages. But to dress it up costs money; to eliminate the frills saves money. What think you, production men?

New Competition

Industries will do well if they bury the hatchet among themselves and consider the competition from other industries. Consider the advance of die casting. Here is a process developed to eliminate metal cutting-machining, milling, and the like. There is a great potential source of overall economy from well-designed die castings for certain types of work.

Each to His Own

Emmons of Cleveland Twist Drill predicted at the National Metal Congress that the multiplicity of new tool materials is on the increase. Interesting how each one finds its own niche in the productive process without putting the others out of business. It means, however, that the production man must learn the peculiarities of every material on the market and find where it best fits. Great economy lies ahead.

Hard Rubber Facts

Engineering tables, properties, and the fabrication of hard rubber go into the make-up of Catalog No. 1 just issued by the American Hard Rubber Co. Not advertising, but a valuable handbook for the engineer, production man, and purchasing agent.

March of Time

At least one large factory has tasted the economies offered by synthetic finishes for passenger car bodies. Among other things it cuts time, reduces the amount of equipment, reduces floor space required for the paint shop, etc. But like everything else, it will take a lot of education to put over. It must be sold to the painter. In the meantime paint manufacturers are taking out some of the kinks developed in production by adding new control devices. Which, of course, is essential to the development of any important product.—J.G.

MANUFACTURING MANAGEMENT METALLURGY

Timken Trailer Axle is Fabricated by El

MUCH has been said in these columns recently concerning the new role of the machine tool builder as a consultant to the automotive manufacturing industry. Obviously the situation holds many opportunities of providing a real service to the designing engineer as well as the manufacturing department. What we have in mind is aptly illustrated by a recent example.

When the Timken-Detroit Axle Co. decided to build a new trailer axle to meet the growing transportation demand, it was found that the best design from an engineering point of view is the tubular section. This produces a structure having not only maximum resistance to bending in the principal planes but also maximum torsional rigidity. Moreover it is easily shown that the tubular section is more economical than certain types of rolled sections since it has the least specific weight for an equivalent load-carrying capacity.

The general features of design of the new Timken axle are shown in Fig. 1. Proof of the few basic facts mentioned above is found in a very interesting little booklet, "Facts About Trailer Axles,"* which compares the tubular design with commonly used rolled sections.

With this as a starting point, it was necessary for the engineering department to get into a huddle with factory executives to determine whether or not this preferred design could be launched economically in production. Specifically the problem involved in the fabrication of tubular sections, ranging in diameter from 3¾ in. to 6 in.; wall thickness of ½ to 9/16 of an inch; and lengths varying between 60 and 94 in. It also required the determination of the best method of applying spring pads, brake flanges and wheel spindles.

After a preliminary survey, all hands decided to investigate the possibility of modern electric welding methods. At this point the representatives of several large manufacturers of welding equipment were called in as consultants.

With their help, equipment was developed to perform the following operations:

1. With semi-finished spindle ends pressed in, the brake flange pressed on and arc-welded in place.
2. Spring pads arc-welded in the same machine.
3. Spindle ends welded to the tube under pressure in a butt-welding machine.

Fig. 2 shows the huge arc-welding machine built by General Electric for ring welding the brake flange forging and spring pads. This machine has four automatic arc-welding heads each of which is mounted on a roller bearing carriage allowing it to be quickly positioned for either the flanges or spring pad on any length or size of axle. When the "start" button is pressed the four arcs are automatically started and instantly the travel motor starts to revolve the axle which is mounted between centers. In this fashion a uniform, deep, penetrating weld is made on the side of the flanges or spring pads. By means of an adjustable synchronous timing relay, the equipment is automatically stopped at the completion of the weld.

A strong uniform weld is made possible by automatic temperature control and the automatic, precision feed of welding rod. Note that the welding rod is fed from four large reels mounted at the ceiling directly over the machine.

Butt-welding of the spindle ends is accomplished on a

* "Wear of Tires," page 422, Oct. 1, 1932, *Automotive Industries.*

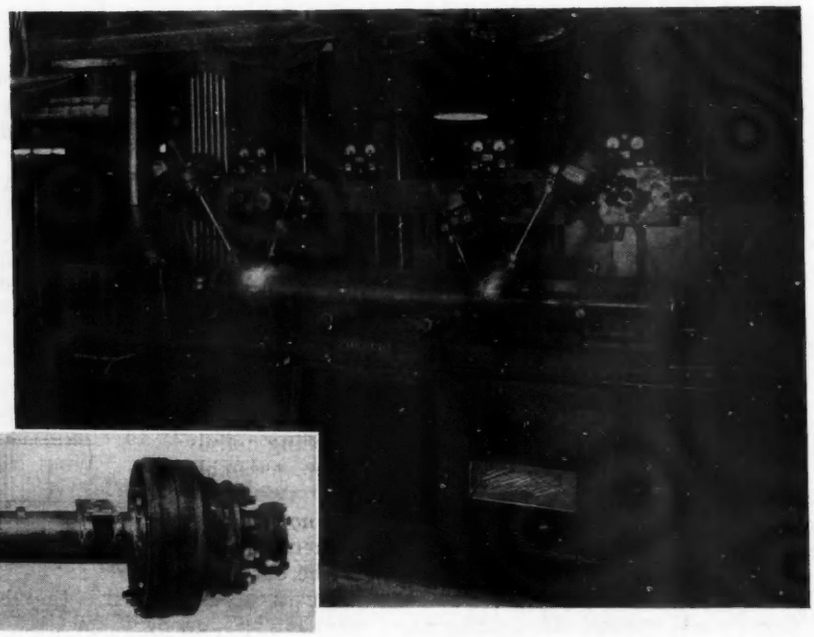
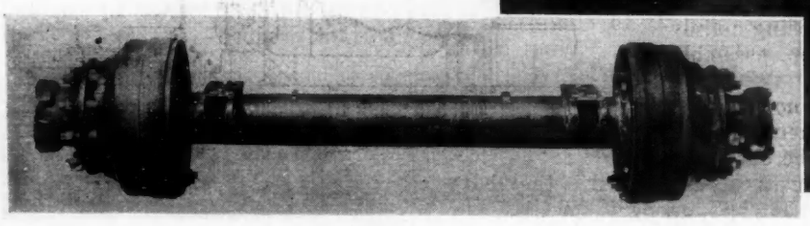


Fig. 2—At the right is illustrated the large machine for arc-welding the brake flange forging and the spring pads

Fig. 1 (below) shows the general design features of the new Timken trailer axle



Electric Welding

Swift butt-welding machine especially designed for the purpose. A close-up of this machine with the axle in place and one jaw removed for convenience is shown in Fig. 3. The tubular section and spindle are placed in special fixtures where the metal at the joint is heated electrically to the proper fusing temperature, accurately controlled. Simultaneously a hydraulic ram forces the two pieces together under great pressure. Actual tests at Timken show that under pressures of 200,000 lb. the welded joints are as strong as the parent metal.

After welding, the spindle ends are ground to close limits and accurately in line with the axis of the tubular section.

As an adjunct to the development of these welding machines, it was also necessary to design special accessory equipment including unusually large motor generator sets. For example, on the General Electric arc welder, shown in Fig. 2, each welding head is fed from an individual 400 amp. motor generator.

The foregoing illustrates beautifully how the development of special manufacturing equipment makes possible the production of an ideal engineering design. Without the essential get-together of the engineers, production men and equipment builders, progress in the automotive industry would be weak and halting indeed, since design would have to be accommodated to available equipment. Here is a fine starting point for advanced engineering design with all the advantages of economical manufacture.

Fig. 3—Butt-welding the spindle ends is accomplished on a machine especially designed for the purpose

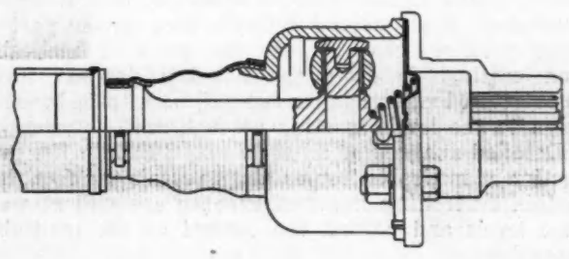
Plymouth Six Has New Type of Needle Bearing Universal Joint

ON the new Plymouth six, described on page 610 in this issue, there is to be found a new type of needle bearing universal joint developed by Universal Products Corp. of Detroit. This joint, developed particularly for lighter cars, has several departures from previous design. In the first place it is completely inclosed, as may be seen from the accompanying illustration.

It will be noted that fore and aft motion is provided in both forward and rear joints and without use of splines. Buttons having spherical heads are inserted in the trunnion pins to permit such a design. Under angular movement these have a combination sliding and rolling movement within the joint housing. The balls of course take the thrust, the buttons being mainly for the purpose of locating the trunnion assembly within the housing.

Under the new arrangement, however, no seal for the needle bearings is necessary, a washer forming the inner retainer and the thrust button the outer retainer. The joints are packed with lubricant at the factory and sealed, and are assembled in the sealed form into cars. A boot provides the seal for one side of the joint, while a light sheet metal grease cover plate is crimped over the flange face. This plate is not removed for assembly into the car.

No lubricating fittings are provided in the joint shown, although these could, of course, be easily installed merely by drilling and tapping a hole in the universal joint housing. The design seems to be such that lubrication of the bearing surfaces is well maintained by centrifugal action while the car is in operation.



End Surface and Flange Grinding With Angular Wheel

TO finish-grind the end of a shaft or a spindle square with its axis, a common method is to true the side of the grinding wheel, relieving it slightly a short distance back from the periphery and then grinding the work between centers as indicated in Fig. 1. Work having a flange or collar can also be ground on the flat surface by the same method.

If production is limited, this means of grinding is satisfactory because a skilled operator is able to turn the work at a reasonable cost. The class of finish may be varied at the operator's will from rough to extremely fine. Sometimes a mottled effect may be produced for appearance sake by allowing the wheel to overheat the work slightly which it does easily because of the broad contact between the wheel and work and the tendency of the wheel to glaze.

From the nature of this method of grinding, the surface produced will show a series of arcs caused by the abrasive grains in the wheel. The marks, however, need not have any appreciable depth in the finished surface especially if the cut is allowed to taper off to the point where no grinding sparks show.

Where production is the important factor, a quicker method of grinding must be used. In such cases the quantity of pieces to be ground usually warrants special equipment, and therefore a machine having the grinding wheel at an angle relative to the work can be used to advantage.

The positions of the wheel and work are indicated in Figs. 2 and 3 from which* it will be seen that not only can a flat surface be produced as in Fig. 2, but by a properly shaped wheel, Fig. 3, a cylindrical surface and a flat surface can be both produced in a single operation.

The grinding lines on the flat surfaces are of course concentric because of the way they are produced. Accuracy, finish, production and ease of operation are dependable factors in this special equipment.

The grinding wheel of the form shown in Fig. 3 is frequently composite; that is, two wheels of different characteristics are cemented together, one is suited to the grinding of the flat surface and the other to the grinding of the cylindrical surface.

Fig. 1

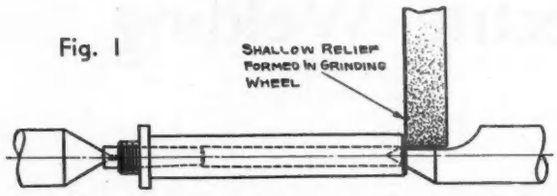


Fig. 2

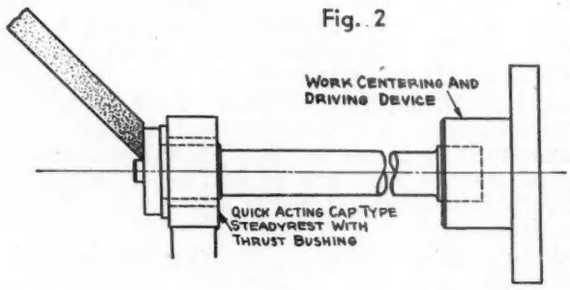
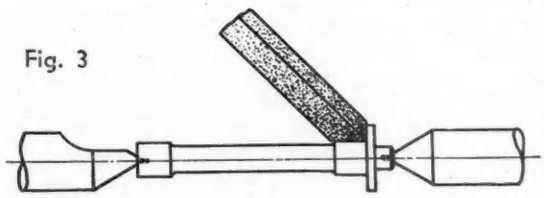


Fig. 3



The proper grades, grains, and structures are governed largely by the material to be ground and it is therefore not practicable to make specific recommendations. Each instance must be considered individually and the most suitable wheel determined by former experience or by trial.

There is a wide variety of work on which an angular wheel slide machine can be employed. This is of course a special machine and is therefore economical only on work that is to be produced in quantities sufficiently large to justify its use.

*From "Grits & Grinds," July-August, 1932

The Cost of Malleable Iron Castings

AT a time when many executives are seeking price reductions in every direction and particularly from certain raw materials producers, it is very instructive to see just what the prospects are for the price level in this important field.

An interesting commentary is found in confidential Bulletin No. 300, reporting on a study of this situation made for the members of the Malleable Iron Research Institute. It all started with the idea on the part of some members that because the price of malleable iron castings is down to or below pre-war level, costs of production can be and will have to be brought down to the levels existing at that time.

Detailed analysis of all costs entering into the production of malleable iron castings reveals the fact that certain controlling items of expense are still at war-time levels and beyond the control of the malleable executive.

In summary, the salient points of the information presented in the report indicate:

"1. That fixed costs of freight, taxes, insurance, electric current and depreciation, or items over which the industry can exercise no direct control, are today 2.2 times what they were in 1914 and pre-war years.

"2. That one-half of the war period increase in labor costs has been deflated and that it would appear that no further appreciable decrease in labor costs could be anticipated.

"3. That costs, other than labor and fixed items, or those over which the industry can exercise some control, are today deflated to a pre-war level.

"4. That, if and when the industry gets back in black figures, it unquestionably will have to be the result of an increase in the price of the commodity, rather than from the effect of any further appreciable cost reduction."

Car Sales Will Bring Machine Tool Buying

by Max F. Wollering

Director of Manufacturing, Hudson Motor Car Co.

THE machine tool industry must remember that it is the ultimate consumer who is wearing out the tools. A motor car design which is so outstanding in its value and its appeal to buyers that they are spurred into purchasing soon reflects itself in activity in the machine tool market. It does not take much stretch of imagination to see clearly the necessity for the machine tool maker to do everything in his power to encourage retail activity.

The motor car of today is a development of engineering research and experiment, together with the invention and manufacture of machinery of high productivity and precision.

The need today is not for machinery of greater capacity. What is required is more work for the machinery the manufacturer already has, and employment of the many people who are unemployed, to operate these machines.

The designing and manufacture of our Essex Terraplane had that thought behind it. The purpose was to provide for the people an automobile of greater comfort, beauty, safety, economy, an automobile with extremely high performance capacity, and to sell it for a low price. Such a car reaches a far greater market, and building it for that market brings about increased work for employees and wears out machinery and tools.

If the manufacturer can wear out his present machinery he will be in the market for new equipment.

There are probably many people who have a desire for a new automobile and have the means to satisfy that desire. It is possible that there are enough such people, that if they should decide to buy a new automobile, which in normal times they would unhesitatingly do, there would be such increased activity in the automobile plants that thousands of people would go back to work.

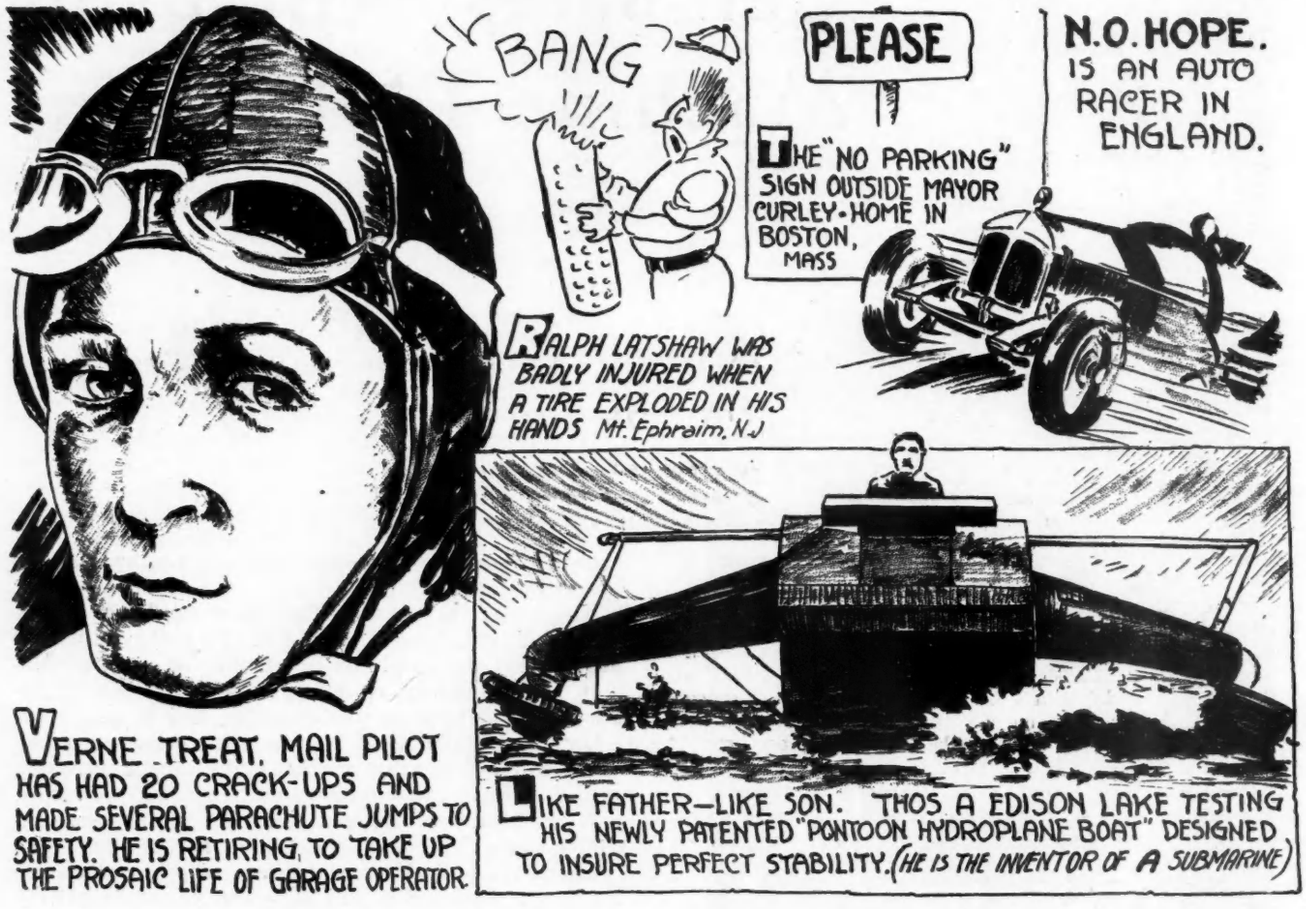
Not only would there be a large increase in employment, but machinery and tools would be worn out and need replacement. The manufacturer can only purchase new equipment when he has profitably used up the old machinery.

If the people who need a new automobile and can afford to buy one, would make the purchase, you would see unemployment gradually cease. The manufacturer then would be in a position to buy the new and advanced machines. The machinery factories then would hire additional people. The steel mills would be busier. The textile shops, the glass factories, the tire factories, the accessories manufacturers, the railroads, all would take on new life. This activity would call upon and absorb the great army of technically trained college men who have been graduating from our schools the last few years, and who have found little or nothing to do since they left college.

When once again the circle of buying and selling has started on its way, there is no doubt that machinery of even greater productivity and precision will be required, so that the great consuming public can be provided with even better motor cars at constantly lower prices.

The first move in this circle is for people to buy a car.

Automotive Oddities—By Pete Keenan



The News Trailer

Write us if you know an oddity

Washington newspapers concluded Roy D. Chapin was "president for a day," when Messrs. Hoover, Curtis, Stimson, Mills, Hurley, Mitchell, Brown, Adams and Wilbur were electioneering or en route to cast their vote. That left Mr. Chapin (the youngest member of the cabinet) in the line of succession (Act of 1886), but the Department of Commerce wasn't created until 1903, when it was the Department of Commerce and Labor. What did that make him? No one was quite sure.

What with election year and George Washington's bicentenary, what could be more appropriate than red, white and blue tires—just delivered by U. S. Rubber Co. to Columbia Nite Lines, Dallas? The buses are decked out in "Oh, Say Can You See" colors to match.

While K. T. Keller and Mr. Pound (director of Plymouth distribution) were broadcasting from New York recently on the nation-wide radio program, Athel Denham, our Detroit editor, was sitting with them in the Detroit Masonic Auditorium. And "You-Know-Me" Barney Oldfield had been chatting with Athel only an hour before at Cass and Baltimore, Detroit—although he, too, sallied forth in high praise of Plymouth from New York microphones. (These advertising men will be the wrecking of us, what with their neat tricks.)

Graham distributors in large cities are getting school children to help promote sales by awarding miniature 18-in. wheelbase Graham sedans to youngsters whose prospect tips result in sales. The children are attracted as they leave school by a Graham show chassis on a trailer and are informed of the prize offer by the sales crew. John Bonbright, Graham's prize-winning publicity executive, sends us a picture of Simon D. Den Uyl, secretary of Bohn Aluminum and Brass Co., and his two sturdy sons, each of the minors holding a miniature car. Mr. Uyl was the first prospect sold through the new plan.

Air-minded legislators of France have formed a bloc to hasten legislation calculated to promote air laws to encourage the aircraft industry there. Each of the ten political parties has representation.

NEWS

Bigger Chevrolet to be Announced Next Month; "2 Lines" Rumor Blasted

Longer Wheelbase, More Power, Improved Performance, Increased Fuel Economy, Finer Bodies at "Price to Fit Today's Incomes," is G.M.'s Bid for Low-price Supremacy

DETROIT, Nov. 12—A radically new line of Chevrolet passenger cars will be introduced next month, W. S. Knudsen, president and general manager of the Chevrolet Motor Co., said.

The new series will be the fifth annual Chevrolet model with a six-cylinder engine, the first volume six having been announced in November, 1928. Since then, building sixes exclusively, the company has manufactured nearly 3,000,000 units.

A longer wheelbase, extensive changes in body design, and a "price which takes account of today's incomes" are promised in the 1933 car. The extended wheelbase, many improvements in the body, increased performance, economy, power, safety and other factors, indicate a model much improved over the present line, and set at rest rumors current in trade circles that the new Chevrolet would be a "stripped" model designed to meet the bare needs of transportation.

From an economic standpoint, the Chevrolet announcement has national significance in that the company leads all other manufacturers in the largest industry in the world. This is one of the major contributions made by any American company this year to national betterment in terms of employment and materials consumption.

Nearly 50,000 of the new 1933 series, valued in excess of $20,000,000, will be required for dealers' announcement purposes alone, and the manufacture of at least that number is assured within the next few weeks, Mr. Knudsen said.

Formal announcement of a new six prior to the actual showing of the car was made possible for Chevrolet this year, Mr. Knudsen explained, because an unexpected and sustained upswing in sales extending from August to October brought a depletion of field stocks much quicker than anticipated. The result is that outstanding stocks of 1932 cars in dealers' hands are less than three per dealer—the best "clean up" the company has ever had. Used car stocks also are at the lowest numerical point since 1925, when the Chevrolet dealer organization was much smaller than today, Mr. Knudsen said. The decrease is said to be from 133,000 units as of a year ago to 60,000 now.

While the Chevrolet executive did not indicate whether he expects the comparatively excellent market of early autumn to continue until the new Chevrolet is displayed, and into the new year, it is a matter of record that the company added more than 800 new dealers in the last quarter bringing the present total to more than 10,100, a mark previously paralleled only in 1929.

Since no similar extensive addition of dealers has been made at any time in the past three years, the move, in view of Chevrolet's dealer policy, is interpreted as an assurance that the company anticipates sufficient volume in the future to enable its dealers to conduct profitable operations.

Willys-Overland Parts Corp. Formed

TOLEDO, Nov. 9—Willys-Overland Co. has incorporated a new subsidiary, the Willys-Overland Parts Corp., to handle sales of the company's parts production.

This business previously has been handled by Willys-Overland, Inc., sales subsidiary for Willys-Overland cars.

New Motorcycle Magazine

LOS ANGELES, Nov. 3—A new monthly national motorcycle magazine, the *Motorcyclist*, appeared Nov. 5. It is the official publication of the American Motorcycle Association.

Denies 26 Ford Plants Will Close in 10 Days

Factory Official Says Misunderstanding Caused Rumor From Charlotte, N. C.

DETROIT, Nov. 7—An official of the Ford Motor Co. today issued an emphatic denial of reports that the company plans to abandon 26 of its inland assembly plants within 10 days.

The report to the effect that assembly work would be centered in six seaport cities was made yesterday in Charlotte, N. C.

The official said: "The Ford Motor Co. is not and has no intention of abandoning any of its plants. This story has arisen from a misunderstanding of some reorganizations we are making to attain better manufacturing conditions.

"As the situation has stood to date, we have been operating 52 plants two or three days a week, getting out from 50 to 100 cars a day at each plant.

"This neither is good from a manufacturing point of view nor does it provide workmen with a living wage. We are, therefore, for the time being, concentrating our production at points where shipping factors are more advantageous.

"Some of the plants will be closed down, but none will be dismantled; all will be kept intact. Just as soon as business picks up and sales warrant increased production, all the plants now being closed will be reopened as and when their added production is needed."

The official said he was unable to make an estimate as to how long this will be.

50,270 Vehicles Made in October

N.A.C.C. Estimate Shows 42 Per Cent Drop From September; 10 Months Show 1,260,849

October production of motor vehicles is estimated at 50,270 units in the preliminary report released Nov. 10 by the National Automobile Chamber of Commerce.

This output is 42 per cent under that for the preceding month, and 38 per cent under the production for Oct., 1931.

On the basis of this report, the industry's production for the first 10 months of the year is placed at 1,260,849 units—45 per cent under the output for the same period last year, the Chamber's statement said.

Reo Reports Loss

DETROIT, Nov. 8—Reo Motor Car Co. and subsidiaries has reported for third quarter ended Sept. 30, net loss of $639,870 after depreciation, etc., against a net loss for the same period last year of $771,345.

German Automotive Business Declines

5-Year Survey Shows Reduction in Vehicles in Service as of 1931

BERLIN *(Special)*—Statistics of automobiles and motorcycles in service in Germany on July 1 last show a retrograde movement. While from the time of the stabilization of the mark (1924) until 1931, the number of vehicles had increased from 290,000 to 1,510,000, during the past year there was a decrease of 5 per cent in the number of registrations.

On July 1 last the number of motor vehicles and motorcycles registered was 1,499,724. To this number must be added approximately 134,000 units which are retired from service for reasons of economy. In other words, 11.4 per cent of the private passenger cars, 12.4 per cent of the trucks, and 10.8 per cent of the motorcycles owned in Germany are out of service. The total number of motor vehicles is divided as follows between the different groups:

	1932	1931
Motorcycles	819,178	792,075
Pass. cars	485,828	510,608
Motor buses	11,274	12,103
Trucks	152,420	161,072
Tractors	24,711	24,788

Development of automobile traffic varies in different sections. In the more agricultural parts of the country, such as East Prussia, Pomerania, Brandenburg, Lower Silesia, Mecklenburg, etc., the number of vehicles is increasing, while the decrease is particularly noticeable in the highly industrialized sections of the West where the decrease in purchasing power and in industrial activity has resulted in a decrease in motor traffic.

Hayes Body Reports Loss

DETROIT, Nov. 9—Hayes Body Corp. reports for quarter ended Sept. 30, 1932, net loss of $86,386 after depreciation, interest, etc., comparing with net loss of $82,730 in preceding quarter and net loss of $106,260 in September quarter of previous year.

For nine months ended Sept. 30, net loss was $269,713 after taxes and charges against net loss of $269,696 in first nine months of 1931.

Oenslager Awarded Medal

George Oenslager of the B. F. Goodrich Co. laboratories has been awarded the Perkin medal for 1933, given annually for the most valuable work in applied chemistry. His selection was based on the pioneering work he has done for the rubber industries on organic accelerators, a work Goodrich statisticians estimate has brought a saving of $50,000,000 a year to motorists.

Oenslager began work in 1906 on the problem that has resulted in the use of organic compositions as accelerators of vulcanization, permits tires and other rubber goods to be vulcanized in a fraction of the time formerly required and has given longer life to tires and other rubber products.

The Perkin medal, awarded by the American section of the Society of Chemical Industry, will be presented to Oenslager Jan. 6 at a joint meeting of the society and the American Electro-Chemical Society, the American Institute of Chemical Engineers and the Societe de Chimie Industrielle of France, at New York.

Com. Hunsaker Heads Aero Science Group

Com. J. C. Hunsaker, vice-president of the Goodyear Zeppelin Corp., has been elected president of the newly organized Council of the Aeronautical Sciences, Inc., Goodyear officials announced this week.

Vice-presidents of the institute are Grosvenor C. Loening, airplane builder, and Edward P. Warner, former assistant secretary of the navy for aeronautics, and editor, *Aviation;* treasurer is Charles L. Lawrence, president of the Aeronautical Chamber of Commerce and designer of the Wright Whirlwind motor; secretary is Major Lester B. Gardner.

Tractor Airwheel In Two Sizes

AKRON, Nov. 7—Goodyear Tire & Rubber Co. has announced their airwheel or superballoon type tire is now available for farm tractors and that the nine makes of farm tractors now in use can be fitted with these big pneumatic tires instead of the steel lug wheels they now use.

The Goodyear tractor tires are made in two sizes, 6.50 by 16 for front wheels, and 11.25 by 24 for rear wheels. The new tires are direct descendants of the airwheel tire introduced several years ago for airplanes, later developed for use on automobiles, and in 1931 introduced as a tractor airwheel tire for use on golf courses, airports and in citrus grove cultivation.

To change a tractor to the new Goodyear tires costs about 20 per cent of the price of the tractor itself.

Denney Leaves Cadillac

DETROIT, Nov. 7—Frank J. Denney, former publicity director for Cadillac Motor with Campbell-Ewald Agency, has resigned to become automobile advertising manager of the *Cleveland News.*

During the past three years with Campbell-Ewald he has worked with all major General Motors divisions, particularly Chevrolet, Cadillac and Buick.

Edward McCammon, formerly of Advertisers Inc., will succeed him.

Editors to Address Service Executives

Shidle, Banigan and Dalton are Speakers; Roche is Guest of Honor at "Editors' Night"

NEW YORK, Nov. 10—Norman Shidle, directing editor, and Leon Banigan, marketing editor, Chilton Co., Philadelphia, and James Dalton, editor, *Motor,* will speak next Thursday evening here at the meeting of the Automotive Service Association. The meeting will be known as the "Automotive Trade Paper Editors' Night."

Other guests will be Frank Roche, publisher of *Automobile Topics;* Alexander Johnston, editor, *Automotive Daily News;* C. F. Broeder, manager, *Automotive Merchandising,* and Henry Clay Fisher, editor, *Fleet Owner.*

Mr. Dalton will speak on "What About 1933?"; Mr. Shidle will discuss "Factory Thoughts on Service," and Mr. Banigan will speak on "Let's Look Around One Corner Where Business Is."

Spicer Reports $304,035 Loss

NEW YORK, Nov. 9—Spicer Manufacturing Corp. and subsidiaries report for nine months ended Sept. 30, net loss of $612,672 after expenses, depreciation, etc., comparing with net loss of $410,628 in first nine months of previous year.

For quarter ended Sept. 30, net loss was $304,035 after above charges against net loss of $136,757 in preceding quarter and net loss of $130,798 in September quarter of 1931.

Patents Tungsten Plating Process

Dr. Colin G. Fink Obtains Protection on New Method

WASHINGTON, Nov. 10—A process for electroplating tungsten from water solutions of the metal salt has been patented by Dr. Colin G. Fink, professor of electro-chemistry at Columbia University, and contributor to *Automotive Industries.*

Although many attempts have been made heretofore to plate tungsten, Dr. Fink is said to be the first to develop a process which gives results sufficiently consistent for commercial success. The metal has unusual properties as a protective coating.

The process produces a smooth, hard, coherent plating of tungsten, silvery white in color, with a high luster. By plating on a polished base metal, the deposited tungsten will automatically acquire a polished surface so that no further polishing is necessary.

Sheet Plants Spurt On New Order Flurry

Pre-Election Boost Given to Steel Mills; Releases in All Price Classes

NEW YORK, Nov. 10—Automotive business on steel producers' order books has broadened further and specifications received immediately preceding election day have made possible in sheet plants the highest operating rate attained so far this year.

Detroit district rolling mills have come in for a large share of this business, but Cleveland and Youngstown mills were also greatly benefited by it. While Plymouth and Chevrolet releases account for a considerable slice of this welcome growth in the demand, a most encouraging feature of the improvement is the increase in inquiries and commitments from manufacturers of the higher-priced units and parts makers catering to these. Decidedly more interest in the market for automotive alloy steels is one of the important developments in this connection.

Pig Iron—Statistical indices reflect moderate improvement in the demand. Purchases of automotive foundries, however, continue for the most part to be along very conservative lines. Prices hold fairly steady.

Aluminum—Imports in the first nine months of 1932 aggregated 6,200,000 lb. compared with imports in the entire year of 1931 of 13,500,000 lb. Automotive demand shows some improvement. The market remains unchanged.

Copper—A fair advance on the London Metal Exchange on Monday, chiefly in response to the outcome of the German elections, caused more firmness in the New York market. The impending arrival of foreign copper producers for the purpose of conferring with American copper interests with a view of curtailing output more intensively, is another constructive factor. The market remains quotable at 5¼ @ 5⅜c.

Tin—Consumers are showing somewhat more interest in offerings. The week's opening quotation for Straits tin was 23.65c.

Lead—Firm and fairly active.

Cleveland Show Moves To Mid-City District

CLEVELAND, Nov. 7—This city's 1933 automobile show will be moved to the week following the New York Show and will be housed in new quarters in the heart of the retail and theater district. The dates are Jan. 14-21, making the opening date come two weeks earlier than it has in recent years. The new show building was formerly occupied by one of Cleveland's leading department stores and is located at Euclid Avenue and East Thirteenth Street.

Guy W. Motz

Guy W. Motz, 45, for 12 years Western representative of the *S.A.E. Journal* with headquarters in Cleveland, died Nov. 4 of a throat infection in Cleveland.

Mr. Motz was born in Akron, and was graduated from Western Reserve University, Cleveland, as a lawyer. He early entered the advertising business, first with an agency and later with the Class Journal Co., as advertising representative of the *Commercial Vehicle*, since merged with *Commercial Car Journal*, a Chilton publication.

He was active in advertising club activities, and was well known throughout the automotive industry. He was a member of the Society of Automotive Engineers, publishers of the *Journal*.

He is survived by his widow, Florence Hoffman Motz, and two daughters.

Chrysler Asks Listings of New $5 Common Stock

4,579,337 Shares to be Exchanged for No-Par Stock

NEW YORK, Nov. 7—The New York Stock Exchange has received an application from the Chrysler Corp. for the listing of 4,579,337 shares of the new $5 par value common stock of the company, which is to be exchanged on a share-for-share basis for the present no-par shares.

Nash Heads N.A.C.C. Taxation Committee

Motor Executive is Veteran Opponent of Discriminatory Levies

NEW YORK, Nov. 7—Charles W. Nash, chairman of the board of Nash Motors Co., has been appointed chairman of the Taxation Committee of the National Automobile Chamber of Commerce, President Macauley announced last week.

Mr. Nash succeeds Roy D. Chapin, recently appointed Secretary of the United States Department of Commerce.

Long a student of the tax problem, Mr. Nash has consistently supported the motor industry's policy of opposition to discriminatory taxation.

Langbein to Introduce Bullard-Dunn Process

Leipsig Firm Enters Contract To Introduce Metal Cleaning

BRIDGEPORT, Nov. 10—The Langbein-Pfanhauser Works, Leipsig, Germany, long recognized as authorities in the field of electro deposition and cleaning metal surfaces, has concluded an agreement with the Bullard Co. to introduce the Bullard-Dunn metal descaling process in Great Britain and in continental Europe.

Careful tests made in the research laboratories of the Langbein Co. proved that the Bullard-Dunn electrochemical method removes every trace of oxide and scale from metal surfaces without the slightest damage to the surface of the metal. The outstanding economy of this process was also confirmed.

81 hp. Dodge Six Shown to Press

Writers See New Low-Hung Line; Improved Transmission, Low Prices, Hold Interest

DETROIT, Nov. 9—Today, at a special pre-view, the new, low-hung Dodge Six cars were shown to business paper and press representatives.

The floating power engine develops 81 hp. The new car has the conventional clutch pedal, but the driver may use an automatic clutch which disengages and reengages of its own accord, as the foot throttle is closed or opened.

The transmission is of helical gear type in all speeds and reverse gear and reverse idler, and incorporates free wheeling.

An improved spring suspension is said to be absolutely free from squeaks and the drag link is parallel to the front axle. Needle bearings are used to further facilitate steering.

The new Dodge will be the first car with super-balloon tires as standard equipment. Front axle and running gear details and the steering mechanism have been specially designed.

Prices will be "surprisingly low," A. Van Der Zee, general sales manager of Dodge, said.

Continental Changes Car Company Name

Division Will be Known as Continental Automobile Co.; Rockelman is Vice-President

DETROIT, Nov. 8—W. R. Angell, president, Continental Motors Corp., has announced a change in the corporate name of the company's automobile division. Continental Automobile Co. has been selected to replace the Continental-DeVaux Co. and will build and market the new line of motor cars which are to carry the Continental name.

Executive offices of the newly named company will continue in Detroit, with manufacturing plants here as well as in Grand Rapids and Muskegon, Mich.

Officers of the company are W. R. Angell, president; Roger Sherman, vice-president; F. F. Beall, director; F. L. Rockelman, vice-president in charge of sales; Wallace Zwiener, treasurer, and W. C. Keith, secretary.

Detroit Show Jan. 21

DETROIT, Nov. 10—Detroit's thirty-second annual automobile show will be held during the week of Jan. 21-28, in Convention Hall, according to Joseph A. Schulte, chairman of the show committee of the Detroit Auto Dealers Association.

Space reservation blanks have gone to motor car manufacturers and distributors who will meet at the Hotel Statler on Thursday evening, Nov. 10, to select space.

8 Months' Gasoline Consumption Down, But August Forges Ahead of Last Year

NEW YORK, Nov. 10—The figures set out below, which are based upon the quantity of gasoline sold or offered for sale, as reported by wholesalers and dealers in the states listed, under provisions of the gasoline tax or inspection laws, reflect, as nearly as it has been possible to obtain it, the consumption of gasoline during Aug., 1932, with previous month and year ago comparisons.

While it is felt that the figures herewith are fairly comparable, it must be borne in mind that more or less widespread tax evasion and changes in the basic laws under which the figures were collected over the period compared may have disturbed the comparability of the figures. It is, therefore, not correct to base percentage changes in demand upon the figures presented herewith. All demand calculations used by the American Petroleum Institute are based upon Bureau of Mines' monthly statistics, which we regard as being more truly indicative of actual consumption. As we see the figures set out below, they represent a break-up, as nearly correct as it is possible to obtain it, by states, of the total demand in the United States, as calculated from Bureau of Mines monthly statistics.

	*Tax Rate August Cents	Month of July, 1932 Gallons	Month of August, 1932 Gallons	Month of August, 1931 Gallons	8 Months Ending With August, 1932 Gallons	8 Months Ending With August, 1931 Gallons
Alabama	5	11,501,000	12,007,000	14,608,000	92,704,000	110,017,000
Arizona	5	5,222,000	5,681,000	6,157,000	46,831,000	50,290,000
Arkansas	6	9,389,000	10,247,000	11,369,000	73,427,000	84,069,000
California	3	104,174,000	114,767,000	119,557,000	920,628,000	955,766,000
Colorado	4	12,836,000	16,244,000	18,448,000	108,222,000	123,234,000
Connecticut	2	23,566,000	24,534,000	25,879,000	160,362,000	161,591,000
Delaware	3	4,572,000	3,309,000	3,859,000	25,352,000	25,045,000
Dist. of Col.	2	9,178,000	9,029,000	8,390,000	68,408,000	61,054,000
Florida	7	15,028,000	15,110,000	15,780,000	143,640,000	159,113,000
Georgia	6	16,682,000	17,643,000	21,037,000	133,701,000	147,684,000
Idaho	5	5,026,000	6,080,000	6,892,000	33,414,000	40,207,000
Illinois	3	88,568,000	91,773,000	102,187,000	635,181,000	671,850,000
Indiana	4	‡37,115,000	42,794,000	48,492,000	299,680,000	322,676,000
Kansas	3	41,683,000	36,208,000	‡51,707,000	231,558,000	258,667,000
Kentucky	5	15,025,000	16,025,000	17,321,000	108,112,000	115,599,000
Louisiana	5	12,996,000	14,249,000	17,291,000	109,122,000	123,194,000
Maine	4	12,869,000	14,492,000	15,874,000	71,938,000	75,144,000
Maryland	4	17,246,000	18,676,000	18,125,000	127,083,000	123,010,000
Massachusetts	3	54,571,000	58,320,000	61,009,000	371,535,000	376,392,000
Michigan	3	59,649,000	77,087,000	87,710,000	505,291,000	554,102,000
Minnesota	3	36,621,000	45,037,000	49,809,000	268,640,000	300,825,000
Mississippi	6	†8,780,000	†9,600,000	11,584,000	†67,717,000	78,107,000
Missouri	2	36,449,000	42,442,000	48,488,000	292,243,000	328,688,000
Montana	5	6,163,000	8,482,000	8,447,000	46,912,000	54,075,000
Nebraska	4	16,151,000	18,455,000	24,787,000	134,010,000	158,888,000
Nevada	4	2,110,000	2,536,000	2,626,000	15,407,000	15,799,000
New Hampshire	4	7,187,000	8,453,000	9,089,000	43,027,000	44,421,000
New Jersey	3	63,867,000	67,728,000	67,146,000	469,470,000	466,768,000
New Mexico	5	4,128,000	4,572,000	5,285,000	30,986,000	35,664,000
New York	3	152,775,000	159,351,000	169,019,000	1,055,558,000	1,066,467,000
North Carolina	6	20,424,000	19,407,000	21,228,000	156,594,000	161,364,000
North Dakota	3	8,999,000	14,802,000	14,650,000	71,413,000	83,172,000
Ohio	4	75,809,000	83,583,000	98,874,000	608,092,000	660,701,000
Oklahoma	4	22,870,000	24,806,000	28,881,000	181,251,000	205,613,000
Oregon	4	13,913,000	15,239,000	17,716,000	108,640,000	120,235,000
Pennsylvania	3	93,376,000	98,707,000	104,435,000	688,158,000	682,704,000
Rhode Island	2	9,485,000	10,550,000	10,674,000	66,903,000	65,273,000
South Carolina	6	8,815,000	9,491,000	11,169,000	69,485,000	80,149,000
South Dakota	4	10,256,000	12,997,000	12,674,000	76,461,000	96,384,000
Tennessee	7	15,403,000	16,024,000	20,111,000	121,790,000	139,677,000
Texas	4	66,447,000	66,700,000	80,555,000	497,066,000	554,836,000
Utah	4	4,751,000	5,544,000	5,906,000	37,115,000	42,458,000
Vermont	4	5,087,000	6,111,000	6,519,000	29,997,000	31,336,000
Total decrease		.....	157,702,000	.....	666,175,000	.....
Virginia	5	19,983,000	22,001,000	24,245,000	151,913,000	157,069,000
Washington	5	20,577,000	24,954,000	24,447,000	166,695,000	178,707,000
West Virginia	4	11,407,000	12,967,000	14,979,000	83,363,000	91,517,000
Wisconsin	4	41,772,000	43,165,000	50,145,000	275,192,000	303,437,000
Wyoming	4	3,738,000	4,263,000	4,764,000	23,798,000	27,222,000
Daily average		43,363,000	47,169,000	52,256,000	41,410,000	44,322,000
Total		1,344,239,000	1,462,242,000	1,619,944,000	10,104,085,000	10,770,260,000
Change from previous year:						
Total decrease		.....	157,702,000	.....	666,175,000	.....
Percentage Decrease in daily average		.....	—9.73%	.....	—6.57%	.....
Iowa	3	29,548,000	.....	.....	.....	.....

* These are state tax rates per gallon. In addition there is the Federal tax of one cent (1c) per gallon.
†—Estimated. ‡—Revised.

Graham Pays $18,000 In Sales Campaign

DETROIT, Nov. 8—Eighteen thousand dollars in prize money has just been awarded by the Graham-Paige Motors Corp. to the winning distributors in the Graham "Big League" intersectional sales contest.

In each of the five "big leagues," the distributor whose sales of Graham cars were the largest per cent of the total sales of ten competitive makes of cars was the winner.

In addition, prizes were awarded on the same basis in the "minor leagues," one for each of the factory's sales districts.

Wayne Registrations Show 42% Decline

DETROIT, Nov. 8—Wayne county passenger car registration in October dropped from 1573 in September to 909, or 42 per cent.

Ford registrations totaled 312, against 612 the previous month and 640 in October last year. Chevrolet was second with 177, against 291 in September and 367 in October, 1931.

Pontiac was third with 65 registrations and was the only car to show a gain over the total for last October.

Plymouth was fourth with 48 fours and 10 sixes registered.

Commercial car registrations totaled 143, against 166 in September and 129 in October last year. Ford registered 78, Chevrolet 33 and Dodge 12.

Hudson October Sales Exceed Last Year

DETROIT, Nov. 8—Sales of Hudson and Essex cars for October, 1932, exceeded those of October, 1931, by 135 cars, in contrast to the loss in sales generally sustained by the industry for that month. As a result Hudson has moved up in standing in the industry. A survey of 222 counties in which more than 100 cars have been sold during the first nine months of this year indicates that in 70 of these counties Hudson-Essex is first in new registrations for September.

In 51 of these counties Hudson-Essex is second; in 31, third; in 10, fourth; in 16, fifth, and in 44, sixth or higher.

Graham Bonus Plan Underway

DETROIT, Nov. 7 — Graham-Paige Motors Corp. has announced a salesmen's bonus plan which went into effect Oct. 24 and which will be continued until Dec. 15.

Every retail delivery of a new Graham six or eight will entitle the retail salesman making the sale to the factory's check for $10 upon receipt of the certificate of sale at Detroit.

The weekly watch awards to retail salesmen is being continued.

LeRoi Gets U. S. Order

MILWAUKEE, Nov. 10—LeRoi Co., manufacturer of industrial gasoline engines, air compressors and generators, has booked a government order for compressors on tractors.

It is the largest order of its kind placed by the government recently.

La Chance Promoted

Stewart-Warner Corporation announces the appointment of Donald La Chance to be in charge of sales in Michigan for the Stewart Die Casting division, succeeding A. C. Olfs.

Mr. La Chance has for many years been connected with Stewart Die Casting Company in the Chicago territory.

Cleary Directs White Merchandising; Bean Continues as Manufacturing Head

Following the merger of the White Motor Co. with the Studebaker Corp., election of James M. Cleary, president, S.P.A. Truck Corp., as president of the White Co., was announced this week by A. G. Bean, president, the White Motor Co.

In his new position, Mr. Cleary heads White sales activities through a world-wide organization of factory branches and dealers. Mr. Bean continues as president of the parent White Motor Co., the manufacturing unit.

George H. Kelly will continue as president of the White Motor Securities Co. and vice-president in charge of finance for the Studebaker, White and Pierce-Arrow companies.

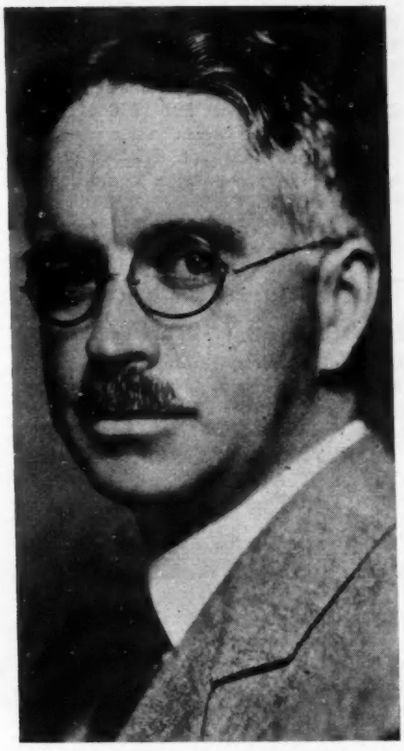
T. R. Dahl, vice-president and secretary of the White Motor Co. and assistant to President A. R. Erskine of the Studebaker Corp., was elected president of White Motor Realty Co.

Mr. Cleary became associated with Studebaker in 1925 as director of advertising and sales research, following a long experience with the *Chicago Tribune*.

In April, 1926, Mr. Cleary was appointed sales manager of the Studebaker Corp. of America. With the formation of the S.P.A. Truck Corp. in 1930, he became its vice-president and general manager, assuming the presidency soon after. He is a graduate of the University of Illinois and Northwestern University Law School and received his law degree in 1909.

The election of Mr. Cleary is the first step since the merger of White with Studebaker toward a branch and dealer marketing organization that will sell four lines of motor trucks and coaches—White, Studebaker, Pierce-Arrow and Indiana.

Local conditions will govern the character of representation in various cities. In some localities, White factory branches or independent distributors will handle all four lines; in others, White branches or dealers will continue to market White and Indiana trucks, while Studebaker and Pierce-Arrow trucks are sold by another dealer.



JAMES M. CLEARY

In announcing these preliminaries of the new sales program, President Bean said: "Each city will receive individual consideration in order that the largest possible volume of sales for each of the four lines of trucks and coaches may be secured."

Two Door-to-Door Vehicles Exhibited

Studebaker Unit and Twin Coach Wagon Shown in Detroit

DETROIT (Special)—Two new door-to-door delivery wagons were exhibited at the recent Dairy Industries Exposition here.

One is known as the Edwards Mono-Trol, in the production of which the firms of Studebaker, Edwards and Bendix join hands. It has a 1½-ton rating, is powered by a six-cylinder engine and is controlled by a single lever. A Bendix automatic clutch and a Bendix B-K booster brake form parts of the control mechanism which permits of the driver operating the vehicle either sitting or standing.

By moving the single control lever downward, the engine is accelerated and the clutch engaged. When the lever is moved to the neutral position the throttle is closed and the clutch disengaged, whereupon the vehicle coasts.

Upward motion of the control lever applies the brakes through the B-K booster. A hand brake is also provided and is located to the right of the gearshift lever.

Another unit of this type was presented by the Twin Coach Co. in its front wheel-drive vehicle. An interesting feature of this design is that the powerplant is located in front of the front axle, which latter is of special design with forged axle ends. Power from the four-cylinder engine is transmitted through a transmission, worm-drive and differential gears combined in an aluminum case, to the front wheels.

The clutch is a Powerflo, which engages and disengages centrifugally. Brakes are Bendix, front and rear. The front brakes, mounted on opposite sides of the transmission, are operated by pedal and lever, the rear by an emergency lever.

Bodies of three different types are being offered, viz., all-steel framework and panels, steel frame and Nicral panels, and Nicral frame and panels.

"Super-Flo" is New Piston Ring Co. Product

DETROIT, Nov. 7—Announcement has been made by the Superior Piston Ring Co. of a new oil ring to carry the trade name of "Super-Flo."

It is characterized by double-flared, diverging inside slots and outer lengthened slots, designed to allow the oil to flow freely and rapidly back into the crankcase. The upper edge of the ring is beveled in the usual manner for cylinder wall lubrication on the up stroke.

The end walls of each slot diverge from the outer to the inner ring face and the side walls of the slots diverge from the outer face to the inner face.

The inner side of the ring shows the double flared and diverging of the end and side walls of the slots allows for an even flow of the flooded area of the cylinder walls back into the crankcase.

This double flaring of the inside slots prevents them from becoming clogged and blocked with carbon, thereby eliminating the evils of carbonization and practically doing away with oil pumping.

Gerald E. Brownell

Gerald E. Brownell, 58, superintendent, grinding machine division, Norton Co., Worcester, Mass., died suddenly on Oct. 30.

He had been employed by Norton Co. for 31 years, beginning as supervisor of installation of grinding machines. He became general foreman, and in 1918 was appointed assistant superintendent. Two years later he rose to the position he held at his death.

Olfs Heads Detroit Stewart-Warner Sales

W. J. Zucker, general sales manager of the Stewart-Warner Corp. announces the appointment of A. C. Olfs as Detroit manager in charge of sales. Mr. Olfs was formerly Detroit representative for the Stewart Die Casting Co., a position which he held for many years, coming into their employ in 1919.

He handled the sales for the Die Casting division of the Stewart-Warner Corp. for the greater part of Michigan, and made his headquarters at Detroit. He is well known in the automotive industry.

Twin Coach Develops Rail-Highway Unit

KENT, OHIO, Nov. 10—The Twin Coach Co., has developed a combination rail and highway motor coach which consists of one of its standard coaches with flanged auxiliary guide wheels added.

There is a flanged guide wheel in front of and behind each rubber-tired wheel, the guide wheels being mounted on a rigging which is attached to the brake spiders of the regular production job.

If it is desired at any point to drive the coach on the road it is only necessary to raise the guide wheels above the level of the rails and drive off the rails.

Motor Products Shows $211,768 Net Loss

DETROIT, Nov. 7—Motor Products Corp. has reported net loss of $211,768 after depreciation and taxes, for nine months ended Sept. 30, compared with a net profit of $205,479 for the same period in 1931.

Net loss in the third quarter was $87,735 against net profit of $55,493 in the preceding quarter and a net loss of $51,642 in the third quarter last year.

Claxton With Mountain Varnish

E. L. Claxton has become associated with the Mountain Varnish & Color Works, Inc., as resident sales manager in Detroit.

Amplex Expands Plant Facilities

DETROIT, Nov. 7—Amplex Mfg. Co. (Div. Chrysler Corp.), has ordered $50,000 worth of equipment, completing a $100,000 program, to increase their facilities for manufacturing Oilite bearings.

Amplex started production of Oilite bearings in Jan., 1930, and this is the fourth major expansion program since that time. The division is operating day and night.

Missouri Gas Tax Collections Are Up

JEFFERSON CITY, MO., Nov. 7—Gasoline tax collections for September amounted to $829,399, as compared with $817,567 for the corresponding month of last year.

Collections for the first nine months of 1932 totaled $6,893,586, as compared with $7,157,312 for a similar period in 1931.

Mack Trucks Report Loss

NEW YORK, Nov. 7—Mack Trucks, Inc., reports for the quarter ended Sept. 30, 1932, net loss of $444,834, after depreciation, equivalent to a net loss of .57 cents per share on 779,362 shares of issued no-par common stock outstanding.

This compares with a net loss of $203,872 in the preceding quarter, and a net loss of $207,439 in the September quarter of 1931.

Net loss for the nine months ended Sept. 30, 1932, was $981,776 after depreciation, equivalent to a net loss of $1.25 per share on 779,362 shares, and this compares with a net loss of $258,765 in 1931.

Tool Engineers Hold Meeting on Thursday

DETROIT, Nov. 11—Members of the American Society of Tool Engineers held their monthly meeting last night here.

O. B. Jones, president of the Detroit College of Applied Science, spoke on "The Tool Engineer's Place in Mass Production."

The A.S.T.E. was organized last March and now has a membership of 500. Its headquarters is at 8316 Woodward Avenue.

Officers are J. A. Siegel, president of the Packard Motor Car Co.; W. M. Smila and E. J. Ruggles, vice-presidents; A. M. Sargent, secretary, and W. J. Fors, treasurer. Tool engineers are industrial executives charged with the tooling, equipment and creation of machinery for factories.

Kelly-Springfield Will Pay Interest

NEW YORK, Nov. 11—Directors of the Kelly-Springfield Tire Co. have voted the payment of six months' interest to Oct. 1 on the new 10-year 6 per cent notes.

The interest will be paid as soon as the notes are issued to holders of the company's old 6 per cent preferred stock under the capital readjustment plan, according to a letter from W. H. Lalley, president, to the stockholders.

This interest distribution will be the first payment to holders of the old 6 per cent preferred stock since April, 1924, when the last dividend was paid on the stock. Under the plan preferred stockholders receive $100 face value of the 6 per cent notes and two shares of new common stock for each share of 6 per cent preferred stock.

Under the terms of the note issue, the company was not required to pay interest on the notes until Oct. 1, 1933, under a provision that no right of action for non-payment of interest accrues to noteholders until three semi-annual interest payments are in arrears.

Mathewson is Speaker

C. W. Mathewson, general sales manager of the Graham-Paige Motors Corp., gave the chief address before the Boulevard Shrine Club in the General Motors Building Nov. 8.

+ + CALENDAR OF COMING EVENTS + +

FOREIGN SHOWS

Glasgow, Scottish Motor Show..Nov. 11-19
Paris, Aeronautical Show...Nov. 18-Dec. 4

CONVENTIONS

Natl. Tire Dealers Assoc., Atlanta, Ga. .....Nov. 14-16
Natl. Battery Mfg. Assoc. Meeting—Cleveland .....Nov. 17-19
International Booster Clubs, Detroit .....Dec. 4
American Society Mechanical Engineers, New York City (Annual Meeting) .....Dec. 5-9
M.E.M.A. Annual Convention, Detroit .....Dec. 5-10
Natl. Exposition of Power & Mechanical Engineering, New York .....Dec. 5-10
Natl. Automotive Parts Assoc...Dec. 12-14
Rubber Mfr.'s Assoc., New York City, Annual Meeting .....Jan. 9
Annual Society of Automotive Engineers Dinner—New York..Jan. 12
Highway & Building Congress, Detroit .....Jan. 16-20
American Road Builders' Annual, Detroit .....Jan. 16-20
Steel Founders Soc. of America—Annual Meeting—Detroit...Jan. 16-21
Annual Society of Automotive Engineers Meeting — Detroit Jan. 23-26
American Soc. for Testing Materials (Annual Meeting)...June 26-30

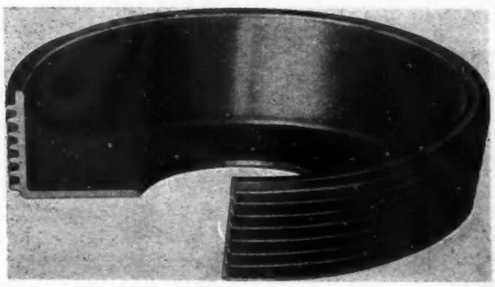
SHOWS

Joint M.E.M.A., M.E.W.A. and N.S.P.A. Trade Show, Detroit .....Dec. 5-10
National Automobile Show, New York .....Jan. 7-14
Pacific Automobile Show, San Francisco .....Jan. 7-14
Los Angeles, Calif., Automobile Show .....Jan. 7-15
St. Louis, Mo., Automobile Show.Jan. 8-14
Buffalo, N. Y., Automobile Show Jan. 14-21
Cleveland, Ohio, Automobile Show Jan. 14-21
Newark, N. J., Automobile Show Jan. 14-21
Cincinnati, Ohio, Automobile Show .....Jan. 15-21
Philadelphia, Pa., Automobile Show .....Jan. 16-21
Baltimore, Md., Automobile Show Jan. 21-28
Detroit, Mich., Automobile Show, Jan. 21-28
Boston, Mass., Automobile Show Jan. 21-28
Hartford, Conn., Automobile Show Jan. 21-28
Harrisburg, Penna., Automobile Show .....Jan. 25-28
Rochester, N. Y., Automobile Show .....Jan. 23-28
Washington, D. C., Automobile Show .....Jan. 28-Feb. 5
National Automobile Show, Chicago .....Jan. 28-Feb. 4
Springfield, Mass., Automobile Show .....Jan. 30-Feb. 4
Indianapolis, Ind., Automobile Show .....Feb. 4-11
Denver, Colo., Automobile Show Feb. 6-11
Springfield, Ill., Automobile Show Feb. 9-11
Kansas City Automobile Show..Feb. 11-18
Des Moines, Iowa, Automobile Show .....Feb. 27-Mar. 4
Seattle, Wash., Automobile Show Feb. 26-Mar. 4

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

Kay-Brunner Brake Drum

Kay-Brunner Steel Products, Inc., of Alhambra, Calif., has introduced on the market a new type of brake drum made of chrome-molybdenum cast iron. It possesses the well-known advantages of cast iron over steel as a material for brake drums.



No steel parts or backings are used in this Kaloy drum, which is produced from electric furnace cast iron. Kaloy brake drums are cast in sand to the final form required and are heat-treated and normalized in pyrometreated controlled furnaces, so that the grain structure is not altered by the temperatures reached in operation. The iron has a tensile strength of 45,000 to 55,000 lb. p. sq. in. and the yield point approximates the ultimate strength.

Sufficient graphitic carbon is said to be present to provide lubrication and to assure quiet, quick, and smooth stopping action. The manufacturers claim that these drums are comparatively free from growth, distortion and failure when exposed to high temperatures. Radiation fins are provided to promote heat dispersal.

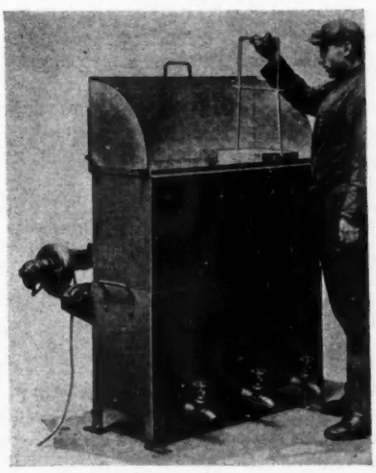
We understand that the manufacturers contemplate distribution throughout the United States.

Blakeslee Degreaser

The National Metal Exposition saw the first showing of the model T, hand dip degreaser which has been added to the line of G. S. Blakeslee & Co., Chicago, Ill., well-known makers of Niagara washing machines.

The Blakeslee Degreasers, unlike their washing machines, which use alkali for grease solvents, employ a chlorinated solvent known commercially as "Blacosolv." Blacosolv is a heavy, colorless, mobile liquid having a pleasant odor, boiling below the boiling point of water. It is not flammable or explosive, nor do its vapors form combustible or explosive mixtures with air. It is said to be an excellent solvent for oils, fats, greases, waxes, tars, gums, rubber, chewing gum, and resins. It has a great thermal stability even at greater temperatures than its boiling point. Water in any amount at ordinary or moderately elevated temperatures does not decompose Blacosolv. A layer of water on it tends to protect and prevent oxidation.

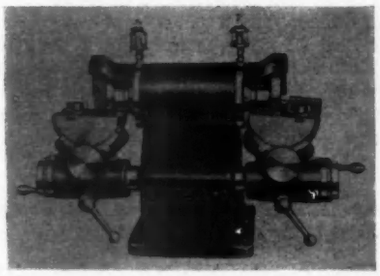
The hand dip solution method gives opportunity to wash not only individual pieces, but nested articles in baskets; they being immersed in three different tanks, a wash, rinse, and final dip. The final dip tank of absolutely pure distilled Blacosolv overflows back and over to the second and first tanks. After washing in the various solutions, the action of the Blacosolv is still further promoted by allowing the work to remain suspended a short time in the degrease, thus insuring positively work degreased is free of oil or any other compound that might have gone into solution. Cold water coils are provided at certain elevations in the degreasers above the liquid so as to cause condensation of gases and control the height of vapors in the machine.



Ex-Cell-O Grinding And Lapping Unit

A complete compact unit requiring a minimum amount of space has been designed by Ex-Cell-O Aircraft & Tool Corp., Detroit, Mich., for grinding and lapping all types of tungsten and tantalum carbide-tipped boring tools, including general purpose tools. The holding of correct tool shapes and maintaining of sharp tools is important to obtain the best results in precision boring. This machine is so designed that it can be mounted either on a table or a pedestal as required.

At the top of the unit is mounted an inbuilt balanced motor with a double shaft projection. On one end is located a grinding wheel and on the opposite end a lapping disk. The motor operates at 3600 r.p.m. and is the same type as used in the inbuilt boring units used on the Ex-Cell-O Precision Boring Machines.



A ring type grinding wheel mounted on a steel back plate with countersunk holes for holding screws is used. It is 6 in. in diameter, with a 1¾ in. grinding surface. By mounting the wheel on a back plate, the entire thickness of the wheel can be used.

The special cast iron lapping disk is 6 in. in diameter, ¾ in. thick, with a 1¾ in. lapping surface on the front side of the disk and a ¾ in. lapping surface on the back of the disk. This provides two lapping surfaces on the disk.

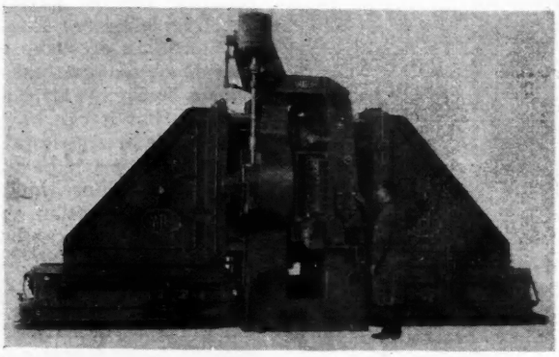
An adjustable table is provided on each side of the machine in front of the grinding wheel and lapping disk. The brackets supporting the tables are mounted on a common shaft supported in the main casting. Each bracket has a horizontal micrometer adjustment. The table proper is mounted on a circular dovetail slide graduated for accurate adjustment to any desired angle.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Natco Multiple Operation Machine

Illustrated is a Special Natco Two-way 4 headed combination drilling, counterboring, facing, chamfering countersinking and tapping machine made by The National Automatic Tool Co., Richmond, Ind., which will be used on the 1933 production line of one of the prominent manufacturers of a low priced six-cylinder car.



The two large units which perform all the operations with the exception of the tapping are equipped with the Natco Hydro Uni-power system of hydraulic feed which is semi-automatic in operation. In addition both units are equipped with a time delay reverse and positive stop.

The tapping heads are driven by a single reversing motor drive unit and each spindle is equipped with an individual lead screw. The latter insures the correct lead on each tap and is a patented Natco feature.

A five position automatic indexing trunnion type fixture was furnished with the machine and it is arranged to hold one cast iron cylinder block in each position.

The machine is semi-automatic in operation and is interlocked to prevent indexing of the fixture before the heads are in correct position, also to prevent heads from starting before fixture is in its correct position. Operator has complete control of machine through the use of one push button station. This machine performs a total of 18 different operations for the distributor shaft hole on the two sides of a cast iron cylinder block at an approximate rate of 75 per hour.

Machine weighs approximately 50,000 lb.

Producto-Matic Milling Machine

Present-day manufacturing requires machines that are highly productive, easily adapted to a wide variety of operations, and quickly changed over from one job to another. It is said that these ideas have been incorporated in the new No. 42 Producto-Matic Miller, just placed on the market by The Producto Machine Co., Bridgeport, Conn.

The Producto-Matic principle of milling is based on the idea of eliminating the loading and handling time by doing this while the milling is taking place; and of locating the work in relation to the cutters to provide the shortest possible stroke for travel.

To widen the scope of these principles a number of improvements have been introduced which are as follows:

1. The use of a drum cam from which all functions of the machine are automatically controlled, for example, vertical and horizontal stroke of cutters; locking and indexing of the table and in some cases clamping of the work.

2. A 2-station type of work fixture table which indexes automatically 180 degrees and is locked during the milling.

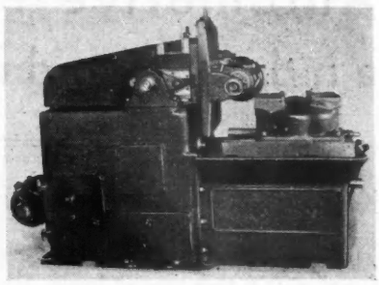
3. Vertical as well as horizontal stroke of cutters in which any stroke in a vertical or horizontal direction or any combination of these strokes to provide an angular or radial cut, can be obtained.

4. Large shaper type of ram with large bearing surfaces to support cutter spindle bearing is cast integral.

5. Wide variety of cutter speed changes from 30 to 1400 r.p.m.

6. Work fixture base machined to receive any number of inexpensive fixtures. Customer can make own tooling same as on any standard milling machine.

7. Cabinet base mounting inclosing all operating movements of machine made in two sections.



8. Complete control of machine from the operator's position with two levers controlling clutches from starting machine and starting the feeds; also the motor switch and the position for loading and unloading work into the fixture.

9. Modern drive from motor using texrope, chain or belt.

In capacity, the machine will take cutters up to 13 in. in diameter. It will accommodate fixtures 20 in. in diameter. The cutter spindle slide has a vertical travel of 12 in.; actual travel of the cutters for milling is only 2 in. Average motor required is about 7½ hp. capacity at 1200 r.p.m.

New "Columbia" Plating Generator

With the increasing accuracy of voltage control demanded in modern plating and electrolytic processes, the problem of minimizing the variation of generator voltage between no load and full load has been receiving much attention. This voltage drop is an inherent feature of the usual shunt wound plating generator, and it has been variously sought to control it by means of separate automatic voltage regulators, by series windings on the main generator fields, etc. It is claimed that the added cost and complication of such methods when dealing with the heavy currents used in electrodeposition work can now be avoided by the separately excited "compensated" plating generator made by Columbia Electric Mfg. Co., Cleveland, Ohio.

While exact details of the new machine have not yet been announced, it is stated that the following advantages are obtained. The voltage may be set for any required voltage drop, for a constant "no load" to full load voltage, or even for an increasing voltage on increasing load. Moreover, this "compensating" effect is produced at all voltages within the operating limit of the machine; that is, the "compensator" circuit and the generator field circuit are separately adjustable and do not affect each other's proper functioning. No automatic regulator, relays or heavy series windings are required.